



A forest village in the Ivory Coast

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PREFACE

IN 1915 a Geographical Section was formed in the Naval Intelligence Division of the Admiralty to write Geographical Handbooks on various parts of the world. The purpose of these Handbooks was to supply, by scientific research and skilled arrangement, material for the discussion of naval, military, and political problems, as distinct from the examination of the problems themselves. Many distinguished collaborators assisted in their production, and by the end of 1918 upwards of fifty volumes had been produced in Handbook and Manual form, as well as numerous short-term geographical reports. The demand for these books increased rapidly with each new issue, and they acquired a high reputation for accuracy and impartiality. They are now to be found in Service Establishments and Embassies throughout the world, and in the early years after the last war were much used by the League of Nations.

The old Handbooks have been extensively used in the present war, and experience has disclosed both their value and their limitations. On the one hand they have proved, beyond all question, how greatly the work of the fighting services and of Government Departments is facilitated if countries of strategic or political importance are covered by handbooks which deal, in a convenient and easily digested form, with their geography, ethnology, administration, and resources. On the other hand it has become apparent that something more is required to meet present-day requirements. The old series does not cover many of the countries closely affected by the present war (e.g. Germany, France, Poland, Spain, Portugal, to name only a few); its books are somewhat uneven in quality, and they are inadequately equipped with maps, diagrams, and photographic illustrations.

The present series of Handbooks, while owing its inspiration largely to the former series, is in no sense an attempt to revise or re-edit that series. It is an entirely new set of books, produced in the Naval Intelligence Division by trained geographers drawn largely from the Universities, and working at sub-centres established at Oxford and Cambridge, and is printed by the Oxford and Cambridge University Presses. The books follow, in general, a uniform scheme, though minor modifications will be found in particular cases; and they are illustrated by numerous maps and photographs.

The purpose of the books is primarily naval. They are designed

PREFACE

first to provide, for the use of Commanding Officers, information in a comprehensive and convenient form about countries which they may be called upon to visit, not only in war but in peace-time; secondly, to maintain the high standard of education in the Navy and, by supplying officers with material for lectures to naval personnel ashore and afloat, to ensure for all ranks that visits to a new country shall be both interesting and profitable.

Their contents are, however, by no means confined to matters of purely naval interest. For many purposes (e.g. history, administration, resources, communications, &c.) countries must necessarily be treated as a whole, and no attempt is made to limit their treatment exclusively to coastal zones. It is hoped therefore that the Army, the Royal Air Force, and other Government Departments (many of whom have given great assistance in the production of the series) will find these Handbooks even more valuable than their predecessors proved to be both during and after the last war.

J. H. GODFREY
Director of Naval Intelligence

1942

The foregoing preface has appeared from the beginning of this series of Geographical Handbooks. It describes so effectively their origin and purpose that I have decided to retain it in its original form.

This volume has been prepared by the Oxford sub-centre of the Naval Intelligence Division under the direction of Lieut.-Colonel K. Mason, M.C., M.A., R.E., Professor of Geography in the University of Oxford, and is the work of a number of contributors, whose names are given on page 393.

E. G. N. RUSHBROOKE
Director of Naval Intelligence
DECEMBER 1943

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CHAPTER I

INTRODUCTION

THE purpose of this first volume on French West Africa is to describe that vast territory as a whole, before Volume II talks of the various individual colonies, which, together, form the Federation. To confine description strictly to French territories would, however, be impossible. Throughout the area covered by Fig. 3 climate, vegetation, fauna, diseases, and peoples have formed their own boundaries over and upon which European penetration has forced its arbitrary pattern. In spite of European differences, the same ancient habits, beliefs, and ways of thought are now giving place to the same economic and social changes. In spite of them the dignified Fulani takes his cattle to their old grazing grounds, the Hausa pedlar goes his round, and the Krooboy frequents every port. New ventures such as diamond mining or cocoa farming spring up almost simultaneously, and that future economic life, already supplanting the purely subsistence activities of the African of yesterday, implies a mutual dependence which no tariffs could prevent. Whilst then the emphasis is, everywhere, upon French West Africa, mention is made, freely in places, of the British, Liberian, Portuguese, and Spanish territories which fit, like bits of a jigsaw puzzle, into the whole.

There are differences, of course. The present-day Frenchman thinks of West Africa as part of that larger North Africa which also includes the Barbary States and Equatorial Africa. His outlook is from the Mediterranean coast, whereas ours, from the seaboard, sees the British West African colonies as separate entities in a scattered colonial empire. Frenchmen hope for a greater France in which liberty and brotherhood will follow French civilization, and in which each part will contribute to the welfare and resources of the whole. English policy is to shape the peoples for eventual independence. Administratively French policy is either to direct or to supplant local native authorities, whereas British policy is to inspire and to buttress. Again, English is not, by regulation, the necessary medium of state assisted education, but in French territories no grant is given unless instruction is given in French. In French territories military service is compulsory, in the other territories it is not. There are differences of outlook on land tenure, on forced labour, and on fiscal policy.

Negroes and Bantus—the peoples of Africa south of the Sahara—are singularly adaptive, however, and take easily to this or that European custom or invention without altering their inherited ways.

West Africa and its Constituent Parts (Figs. 1 and 2)

The area of the whole block is more than $2\frac{1}{2}$ million square miles, more than twenty-five times that of Great Britain or two-thirds that

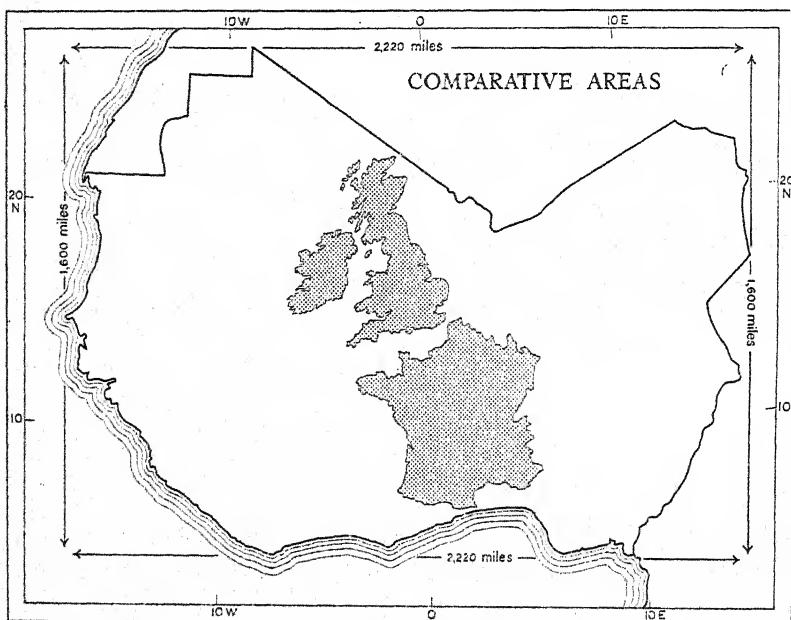


FIG. 1. Comparative Areas

of the United States. Its population is over 44 millions, less than that of Great Britain and little more than a third of that of the United States. To these totals French West Africa itself contributes three-quarters of the area and but a third of the population, for large parts of it are desert and support less than two people per square mile.

The colonies which, together, make up French West Africa are seven—Senegal, French Guinea, the Ivory Coast, Dahomey, French Sudan, Niger, and Mauritania. To them must be added the mandated territory of Togo. Their boundaries will be described in Volume II. In no case are these boundaries closely defined by any fact of physical or racial separation.

The Sahara, it is true, is an effective barrier to intercourse, dividing the Mediterranean peoples of the Barbary States from the Black Africans of the south, but the actual northern and eastern boundaries of northern French West Africa with Rio de Oro, Algeria, Libya, and French Equatorial Africa are but arbitrary lines across the desert. The boundaries which separate the coastal territories under other flags from French West Africa mark the limits to which the

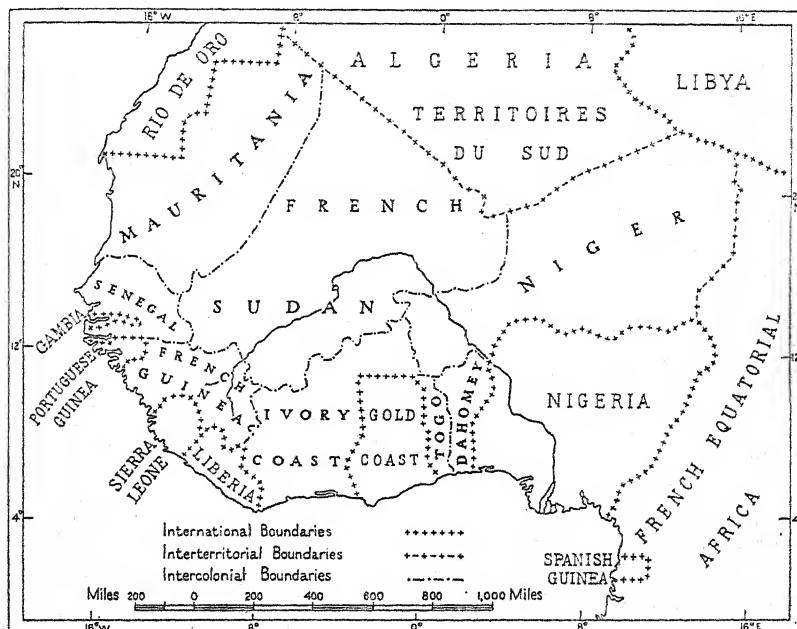


FIG. 2. *Political and Administrative Divisions*

respective Powers had been able to secure treaties or concessions from this or that chief, and then to complete the 'effective occupation' demanded by the Berlin Conference.

The least important territory not under the French flag is the Spanish Rio de Oro, which lies, for 600 miles, along the Atlantic coast between Morocco and the French colony of Mauritania, the north-western portion of French West Africa. The surface is wind swept and desert, and there is only one inhabitant to every 2 square miles. It is mentioned solely because of its proximity to French West Africa.

Portuguese Guinea is nearly at the most westerly part of the

Atlantic coast. To its north is Senegal, and to the east and south French Guinea. From early times the coast offered trade facilities, for it is rich in estuaries and arms of the sea. The Bissagos islands lie off shore. The surface is low-lying, badly drained, and particularly unhealthy. The area is about 14,000 square miles.

Liberia, more than three times as big as Portuguese Guinea, is still mainly unexplored. Colonization by freed American slaves began in 1822, but the descendants of these, and later, immigrants are a very small minority of the population. The country, sloping from the Guinea Highlands to the sea, is drained by many rivers, and is, potentially, good agricultural land. On the north it is bounded by Sierra Leone, on the north-east by French Guinea, and on the east by the Ivory Coast.

Much incidental information on Portuguese Guinea and Liberia, but little on Rio de Oro, is given in those chapters which treat of West Africa as a whole. Appendixes give summaries of the salient features of these three territories.

The British colonies, so interwoven with French West Africa, are the Gambia, Sierra Leone, the Gold Coast, and Nigeria. As a consequence of their original selection as trading stations, and of continuous development for a longer period than has been available in most of French West Africa, they are comparatively wealthy and well populated. No part of this volume is devoted to them, but they are mentioned freely wherever their characteristics help to an understanding of West African conditions.

Physical Characteristics (Fig. 3)

Africa, south of the Sahara, has many striking features, and yet is mostly remarkable for the monotony of the vast plains and uplands which spread over the surface of its ancient tableland. West Africa is true to type, and yet lies at a lower level than most of the continent. Its plains stand mainly between 500 and 1,000 feet above the sea. Along the northern edge (centring on latitude 20° N.) is a band of desert country, roughly 1,500 feet above the sea, from which occasional massifs rise. It stretches from the coast of Mauritania to the eastern boundary of Niger and continues far beyond. South of this band lies the depression, or ancient sea-bed, through most of which flows the middle Niger. Southwards again (along lat. 11° N.) the plains rise to separate the drainage of the Niger from the rivers which flow to the Guinea coast. At either end the central depression is closed, or nearly closed, in the west by the low divide between the

Senegal and the Niger, in the east by a broad col between the Air mountains of Niger, and the Bauchi plateau of Nigeria. Practically nowhere is ground higher than 4,000 feet, and in spite of the occasional massifs there is relatively little mountain scenery.

Climate

Hill features do little to break the monotony of the plains, but variety lies in the climate, the vegetation, and the peoples. Along the Guinea coast from Conakry to Port Harcourt the rainfall, rising in places to nearly 200 inches a year, is just about 100 times as great as along the northern desert edge. In these tropical latitudes there is little consistent and gentle rain; indeed it hardly ever rains but it pours. Along the south and south-west coast it may rain at all seasons, whereas rainy months decrease steadily as latitude increases until they vanish, and what rain does come is in the occasional storm. The rain comes with the south-west monsoon, and extends only so far north as the monsoon penetrates, which it does to varying distances according to the time of year. The harmattan, a dry and dusty wind from the Sahara, advances and recedes to conform with the monsoon.

Weather is therefore almost a function of the latitude; the exception being that heavy rain, breaking on the Guinea Highlands and Fouta Jalon which back Liberia, Sierra Leone, and French Guinea, extends farther north along the south-west shore than it does elsewhere.

Flora and Fauna

Vegetation follows the same pattern as climate. Southwards from the rather euphemistically named Cape Verde the shore becomes greener and only where, along the gulf of Guinea, the direction of the coast coincides with rather than opposes that of the monsoon, is it comparatively dry, in contrast to the luxuriant mangrove fringes common elsewhere. Inside the narrow coastal strip lies the dense and sombre forest belt. For about 150 miles it stretches inland, hostile to any other form of life save that of monkeys, birds, reptiles, and insects. Beyond come broad savannas, the forest thinning first to scattered woods and then to single trees, till agricultural Africa turns to sand or rock and cultivation to the camels, fleeceless sheep, and goats of the nomads.

Game, not so plentiful as in East and South Africa, is still common enough on the savannas, and elephants are also to be found. Lions roam wherever there is game, whilst the more common leopard

frequents the forest also. There are many poisonous snakes, but the chief pests to mankind are the mosquito and the tsetse-fly.

Health

The climate is enervating from the Guinea coast as far north as the beginnings of the Sahara, for it lacks variety. Nights are little cooler than days, and the damp of the coast and the forest adds to discomfort. Now that the cause of malaria is known, its prevention and its cure, West Africa is no death-trap. It was the 'white man's grave' only so long as the white man failed to adapt himself and never as a direct consequence of the climate. The native population, however, does suffer much from endemic diseases, the chief of which are malaria and sleeping-sickness.

Peoples and History

The earliest inhabitants of the land were the pygmies, but they, driven first into the forest, are now wholly absorbed. In West Africa their place knows them no more. Then came the negroes from the east, whilst, probably from very early times, the Berbers raided southwards from, or across, the Sahara. Fulani, circling north Africa from the east, appeared near the west coast, whilst Arabs of the Hilalian invasions reached Mauritania in the west and Chad in the east. The Berbers, taking refuge from the Arabs, settled in the Ahaggar mountains and raided south again. The Fulani, ardent Moslems, have spread eastwards, comparatively recently, acquiring overlordship as they went, and dividing into two castes, the one political, the other—the 'Cow Fulani'—retaining the ancient nomad customs. Few of these northern herdsmen came to settle, however, nor did they penetrate to the southern savannas and least of all to the forest belt, so inimical to their way of life. But Islam is a militant creed and under it the enslavement of the unbeliever has flourished. Gang after gang of slaves crossed the Sahara and blood has mixed freely so that as the rainfall lessens, and vegetation thins out, so does negro blood, purest in the forest, thin out gradually till it reaches to the Barbary coast itself.

Europeans began to touch at the harbours of West Africa in the fifteenth century. For 300 years they were content with trade, generally conducted through native middlemen. Then colonial rule began, but tentatively and only along the seaboard. The classic journeys of Mungo Park (1800) and Heinrich Barth (1850), described in Chapter VI, mark, respectively, the beginning and the peak of

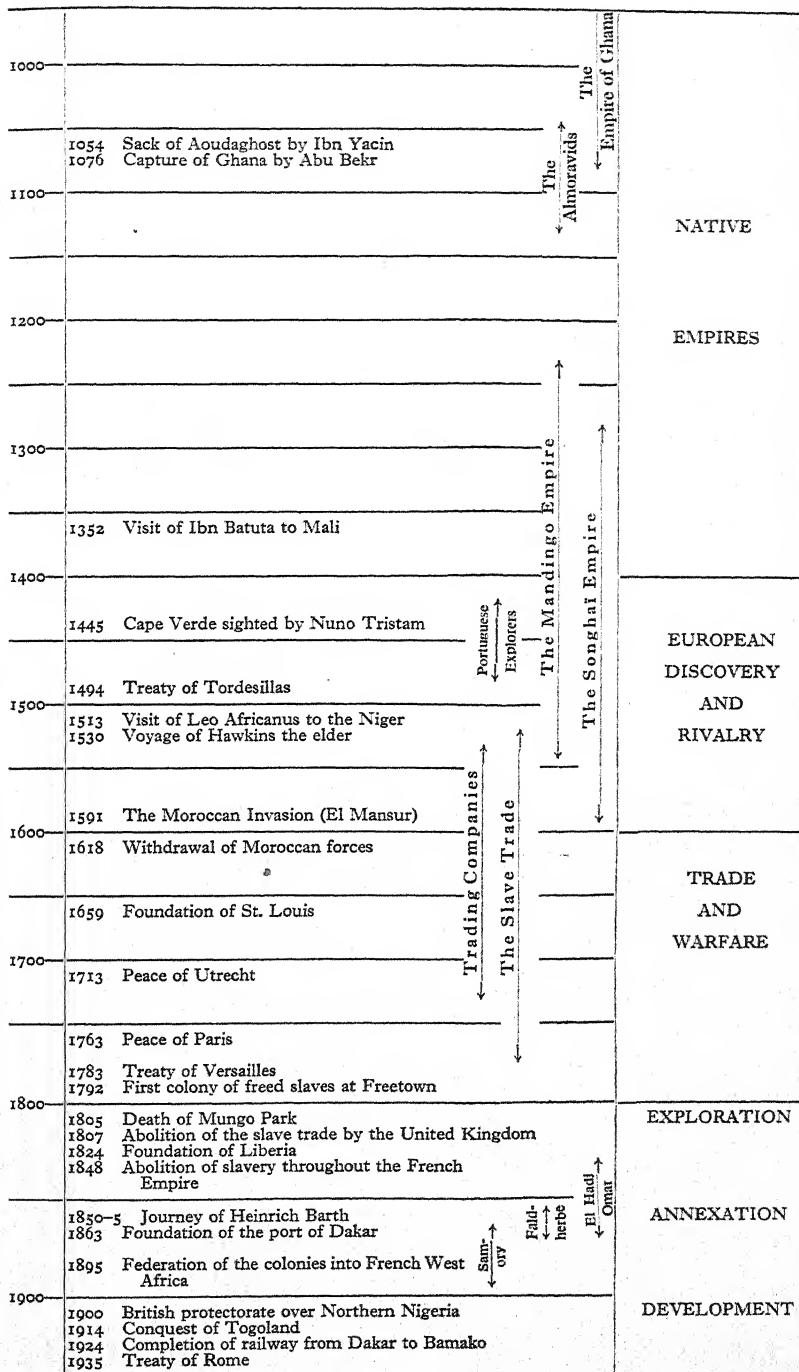


FIG. 4. *A Thousand Years of West African History*

European exploration of the interior. By far the largest area of French West Africa has been occupied within the last 100 years, much of it within the last half century, and it is, therefore, of quite recent times that Europeans have appeared inside the forest belt. Until they did so West Africa was divided into the moslemized north, the pure negro communities of the forest, and the dawning European civilization of the coast. Whilst negro blood predominates everywhere, therefore, mankind looks very different as one passes from the European shirts and trousers of the coast and of the larger towns, through the largely unclad men of the forests, to the white robes of Islam on the northern savannas.

Negroes have not been found wanting in statecraft, as Chapter VI will show, but the early, and sometimes powerful, well-organized and wisely governed empires have been, generally, in the northern savannas, where rainfall is just sufficient for good husbandry, and sufficiently close to the great caravan centres on the Niger to enjoy the benefits of trade and the stimulus of foreign blood, thought, and aggression. Under all these empires slavery flourished, for slavery was native to African thought before ever the nomads from the north and the Europeans from the coast so greatly increased the demand. Later negro empires, the Yorubas, Ashantis, and Dahomeyans, owed much of their origins, importance, and revenues to the supply of slaves in both directions. Other recent native empires have been due to 'mongrel vigour'—the stimulus of mixture—as in the case of the Hausa states, or to Moslem zeal, as in the spread of Fulani overlordship.

Administration (Fig. 2)

Administratively Senegal has always been the most important of the French colonies. French Guinea, French Sudan, Niger, and Mauritania were occupied by expeditions from Senegal. For a time the other colonies were grouped together as the 'Rivières du Sud'. When, in the early years of this century, the final occupation of French Sudan linked all French West Africa together, a full Federation very naturally followed. The Governor-General, his councils, and the heads of technical services are at Dakar—the capital. The Governor-General stands between France and the individual colonies, each of which has a Governor, Executive and Colonial councils, and representatives of the technical services. Each colony is divided into provinces (*cercles*), and subdivided into subdivisions, cantons, and finally villages. The Colonial Administrative Service, in which there

is no colour bar, ranges from the highest ranks down to subdivisional Commissioners, while native chiefs answer for cantons and villages and are represented in the subdivision and sometimes in the province. The Federal Government, charged with policy and finance, draws its revenues mainly from custom dues. It is interesting to note that commissioners of provinces and subdivisions have more direct control over the working, in their areas of technical services such as public works, postal services, and roads, than do our commissioners of equivalent rank. Togo is a class 'B' mandate. The Governor-General is, *ex officio*, High Commissioner of the Territory. Save that there is no military conscription, administration follows closely on the lines of French colonies.

Agriculture and Natural Resources

Africa is not a land of rich and fruitful soils, and again West Africa is true to type. Moreover here, as throughout the centre of Africa, the tsetse-fly, flourishing in moist and shady parts, is fatal to stock and prevents mixed farming. Cattle are therefore few in the agricultural areas, little is given back to the ground, and for every acre under crops three or four are fallowing. Yet, until quite recently, practically every African was a husbandman, and men, women, and children had their well-established parts to play upon that part of the tribal land entrusted to their charge. From north to south millet, maize, and rice are the cereals, yams and manioc the main roots, and plantains the most eaten fruit. The forest and the savannas add useful natural vegetables and foods.

Large areas may be won for intensive agriculture in the Niger bend. That great river, drawing its headwaters from Fouta Jalon and the Guinea Highlands, flows north-east into the desert, and, in the flat central basin, breaks up into many streams and lakes. The soil is black and fertile, and irrigation is already proving very successful. Larger schemes are in view. One great advantage of this area is that it is free from the tsetse-fly and suitable for mixed farming. In both French and British territories steady progress is being made by the agricultural authorities, both in stock and in crop farming. Agricultural schools and co-operative societies are spreading more intensive methods.

Before the advent of settled government, farming and fighting filled the lives of almost all men. Now labour is required for development of all sorts—road and rail construction, mining, transportation, and the like; clerical and industrial workers have to be fed as well as

the family, and crops must be grown, or products gathered, for export, in order to pay for the more efficient tools and the desirable luxuries which can now be bought. A new agriculture is starting, and the cocoa and ground-nut plantations are its most remarkable features.

Gold, salt, ivory, and slaves were the treasures which first tempted marauders across the Sahara. To-day gold, diamonds, manganese, chromite, ilmenite, zircon, iron, and platinum are all being mined. There is much to develop and much still to find. Ivory is no longer an export of value, and, although salt is produced, the needs of the people are met more by import than by local production.

Communications

Black Africa is nowhere easy to penetrate from the sea, and West Africa shares with French Equatorial Africa its least hospitable shores. It is true that the muddy estuaries between Dakar and Sherbro island, and the Oil Rivers—the delta of the Niger—give opportunities for small craft, but elsewhere bars and surf ring the beaches, no river offers easy navigation from the sea, and the forest belt adds its sombre defences. To the north the desert, though no inviolable barrier, prevents the passage of large bodies of men. Only from the east is ingress easy.

Dakar, the port which comes third in importance throughout French lands, and Conakry are the only two natural harbours of French West Africa; as are Bathurst, Freetown, and Lagos of British. Takoradi, the most important, and indeed the only, good artificial harbour of West Africa, was opened in 1928.

The Gambia and Senegal rivers were the first to help in penetration, but even they failed to open an easy approach to the Niger, the key to the occupation of the Sudan. Not until 1906 did the French open a way, by river and railway, from the Sudan to the sea. The great medium of inland water transport is the Niger, in spite of the falls and rapids which split its great length into separately navigable stretches. It forms a great arc across the French Sudan, and towards its head the railways which run inland from the coasts of Senegal, French Guinea, the Ivory Coast, and Dahomey. The French railways are all metre gauge, and the proposed trans-Saharan route to join Colomb Béchar in Algeria to Dakar, Cotonou, and Lagos in West Africa and to Bangui in French Equatorial Africa, was also to be metre gauge. Rio de Oro, Portuguese Guinea, and Liberia are innocent of railways. Those in Nigeria and the Gold Coast are mainly 3 ft. 6 in. gauge and in Sierra Leone the small gauge is 2 ft. 6 in. In these British colonies railways are, comparatively, more developed than

in the French Federation, but only one—that from Lagos to Kano—penetrates far inland.

The first Great War (1914-18) gave a new and powerful impetus to the spread of the internal-combustion engine and to the use of motor transport. For a time the emphasis was put on road building. As throughout Black Africa, the natives take readily to motor driving, and the dirt roads are good enough, when not cut by floods, for a powerful car with good clearance. What is particularly wanted is the re-alinement of the old trails which served foot traffic only, and the building of bridges to replace the often dangerous, and always lengthy, crossing of rivers by pontoon. The upkeep of those roads which serve the main ends of strategy and internal security is looked after by the Federal Government. These are the 'inter-colonial' roads. In and close to the larger cities roads are properly foundationed, and then tarmac'd. Elsewhere comparatively little engineering has been done.

Three fairly good and several very indifferent tracks lead across the Sahara to Morocco, Algeria, and Tunisia. These are known as the 'Imperial' roads. Fair roads lead from Kano, in northern Nigeria, and from the Gold Coast, into French territory. Elsewhere, though many rough tracks are available, political differences hinder modern transportation across the frontiers.

Trade

The external trade of West Africa, totalling in 1935 about 57 million pounds, is but 18 per cent. of that of Africa south of the Sahara. Of these totals French West Africa supplies a third, or rather less than British Nigeria. French West Africa takes half its imports from France and to it sends three-quarters of its exports. Although mineral exports are increasing, the bulk of the exports is still in natural tropical products such as palm oil, ground-nuts, or cocoa. Imports still tend to exceed exports; for development of all sorts is still proceeding rapidly, and requires steel, cement, rolling stock, and motor vehicles.

Maps and Spellings

There has been no time to survey West Africa in any precise sense. The French have made a good beginning in Senegal and French Guinea, and fair topographical maps have been made of the British colonies, but no general triangulation controls the mapping of the country as a whole. As a rule positions should be correct to within half a mile and heights to 100 feet. Liberia is little known in detail and quite unsurveyed.

A review of the whole country, irrespective of flag, meets with the difficulty of differences in the choice and spelling of the names of peoples and places. For example the Fulani, so well known to us by that name, are called Peulhs by the French. Then French custom is to use 'ou' for our 'w', so that a wadi becomes a ouadi.

Two maps will be found in the end pocket. The first—geographical—is one of almost the whole of the block of West Africa. It is at the largest possible scale ($1/4,000,000$) that can be used for so large a country. Although convenient, this map is no more accurate in detail or up to date in communications than any other of those which might be considered. With so much unsurveyed country to embrace, and with so many current changes, no map can be accurate in all its details. The spelling of place-names in the text is based upon this map save where long British association warrants exception. Positions (latitudes and longitudes), as given in the Index, also follow this map, because they are quoted only as a means of identifying places upon it. The exception to this last rule is in the description of meteorological stations which may lie at a distance from the towns with which they are associated. Since all the latitudes considered are north of the equator, no N(orth) is added to them, but the longitudes, some east and others west of the Greenwich meridian, need the added letters E. or W. The second map is one of the main ports, rivers, roads, railways, and signals which, together, form the present network of communication.

Scope of Volume I

Since this volume treats of West Africa as a whole, it omits such detailed information as comes best under descriptions of each French colony. Thus full descriptions of the ports and coasts are given in Volume II. The chapters on physical description, climate, vegetation and fauna, health, mineral economics, agriculture, and communications, are general to the whole block. Those on history, the people, administration, and commerce and finance deal with the whole of French West African territory.

Orderly but quick settlement, the comprehensive study and improvement of native activities, the vast distances to be covered, and the very few years which have been available for the task, have not allowed of an adequate record, whilst two great wars have intervened to limit effort, to restrict publication, and to divert energy. It has not been easy, indeed it has sometimes been impossible, to secure adequate information on all the topics dealt with in this volume.

CHAPTER II PHYSICAL DESCRIPTION AND GEOLOGY

INTRODUCTION (Figs. 5 and 6)

THE greater part of the African continent consists of moderately elevated tablelands, and an unusually small proportion of its surface is occupied by very high and very low ground.

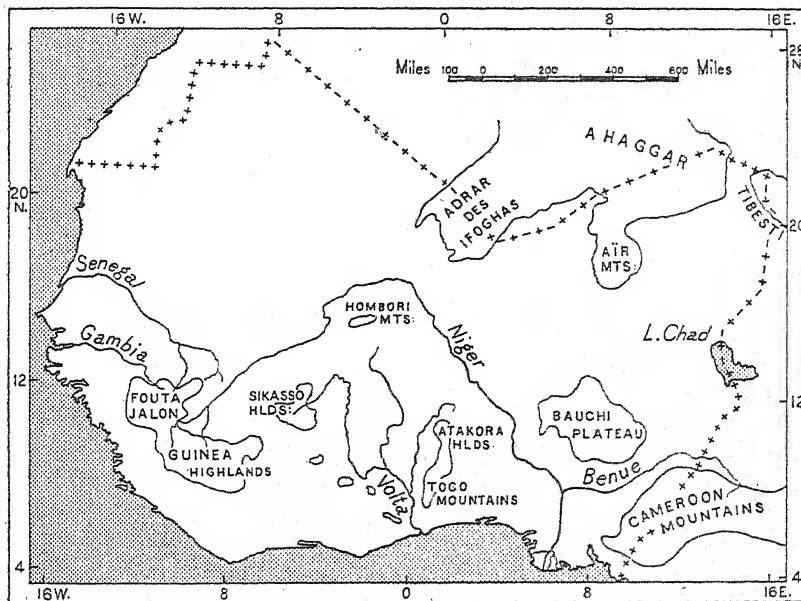


FIG. 5. Important Relief Features

To this generalization West Africa is no exception. Although it lies lower than the plains of East and South Africa, approximately half of its area is a tableland between 500 and 1,000 feet above sea-level. On it, however, certain features deserve mention. In the east the Bauchi plateau, and in the south-west Fouta Jalon and the Guinea Highlands,¹ are outstanding, and rise, here and there, above 4,000 feet. In the north-east are Adrar des Ifoghas and the Air mountains

¹ This name is used throughout this and later chapters to denote the high country backing Sierra Leone and Liberia. It is often called the *massif Léonais-Libérien* by French writers.

whose highest peaks reach 3,000 feet. An important but often ill-defined watershed runs eastwards, between the Niger and the gulf of Guinea. From it, lower, but still important, ridges extend southwards converging upon Accra in the Gold Coast and forcing the lower Volta into a bottle-neck.

In Cretaceous times the northern slopes of this divide were drained by rivers flowing to an ancient sea lying across the southern Sahara. The head-waters of the Senegal, the upper Niger, and the head-waters of the Black Volta represent those streams, and the lakes of the 'inland delta' on the Niger are probably remnants of that sea. All these rivers now turn west or south to the Atlantic, but the north-easterly direction of the upper Niger is of the utmost importance to the economic life of the interior. Like the Nile, the river runs from a region of heavy rainfall into a desert.

OUTLINE

Broadly speaking, the coastline of French West Africa can be divided into three well-defined sections. The west coast north of Dakar is smooth and harbourless, swept as it is by the Canary current. Similarly the sandspits and lagoons of the south coast are the handiwork of the Guinea current. Separating these two, and in marked contrast, are the muddy estuaries and low islands that extend between Dakar and Sherbro island. On whichever section a landfall is made, the first view of the continent will be a low surf-beaten shoreline, for high cliffs are rare and only occasionally are hills found close to the sea.

The coastal plains are wide and flat in Mauritania and the Ivory Coast, where they stretch inland for 100 to 200 miles. Narrowing in the south-west and the Gold Coast, these plains have been very actively eroded by streams from the high ground that closes in on them. East of the Volta they are interrupted by a narrow, highly dissected ridge known as the Togo mountains. Everywhere vegetation, changing with the climate, varies their actual appearance.

The rise from the coastal plains to the interior tableland is, generally, one of steps rather than of gentle slope. In Mauritania the single step is marked by a definite scarp. Ground rises steeply, through much eroded foothills, to Fouta Jalon and the Guinea Highlands. In the Ivory Coast low steps rise imperceptibly to the plateau above. Whether the plateau is low or high, ill-defined or well-marked, rapids mark the descent of the rivers to the coastal plains.

DRAINAGE

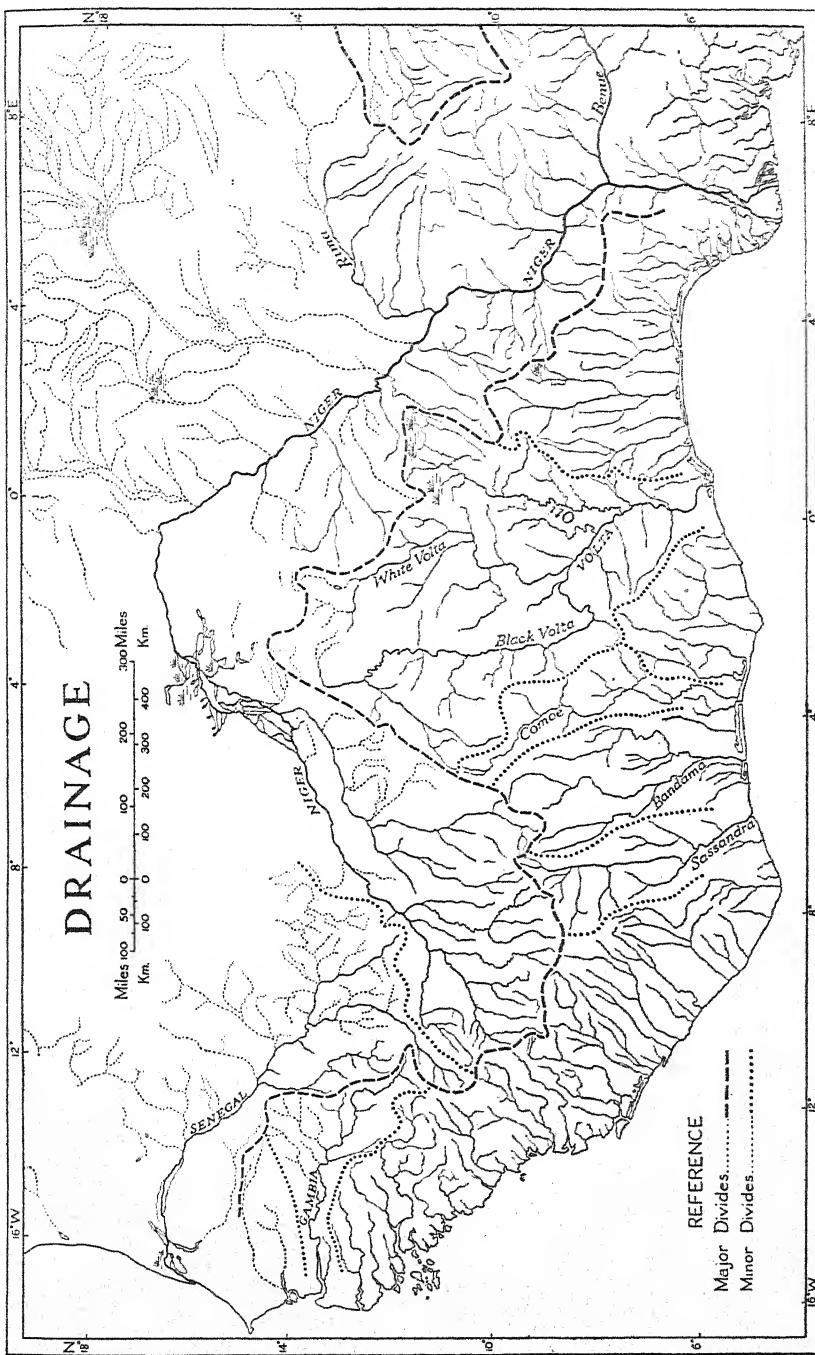


FIG. 6. Drainage

As the sections given in Figures 21 and 22 show, the tableland of French West Africa is monotonous in the extreme. Really hilly country is confined to Fouta Jalon and the Guinea Highlands in the south-west, and to Adrar des Ifoghas and Aïr in the north-east. Elsewhere, both on the grasslands of the centre and in the deserts of the north, slightly undulating plains extend as far as the eye can see, relieved only by isolated rock masses or by an occasional broken line of scarped cliffs. Indeed it can be said with truth that seasonal changes in vegetation and the scattered native villages with their clearings for crops give the only relief from this general monotony.

REGIONAL DESCRIPTION (Fig. 7)

For purposes of more detailed description the country can be divided into the following seven regions:

- a. Mauritania—the desert north of the Senegal river.
- b. Senegambia—the basins of the rivers draining the northern slopes of Fouta Jalon.
- c. The Upper Niger Basin—the valley in French Guinea, French Sudan, and Niger as far as the Nigerian border.
- d. Northern French Sudan—the desert north of the Niger, and Adrar des Ifoghas (Iforas).
- e. Niger—the desert and semi-desert surrounding the Aïr mountains.
- f. The South-west—Fouta Jalon, the Guinea Highlands, and the coastal lowlands of Portuguese and French Guinea, Sierra Leone, and Liberia.
- g. The Guinea Coast Basins—the valleys of the Ivory Coast rivers, of the Volta, and of the Togo-Dahomey rivers.

MAURITANIA (Fig. 8)

The relief of the western Sahara reflects very closely the direction of the prevailing north-east wind, for vast areas are covered with sand-dunes running north-east to south-west. The low plains of Mauritania, running some 200 miles inland from the coast, are largely cloaked by these dunes, and it is only in the extreme south that they are absent. Here expanses of clay present a most monotonous surface, which is dotted with lakes and marshes in the wet season. Along the right bank of the Senegal river, the southern boundary of Mauritania, is a strip of country annually fertilized by its flood. East of these plains

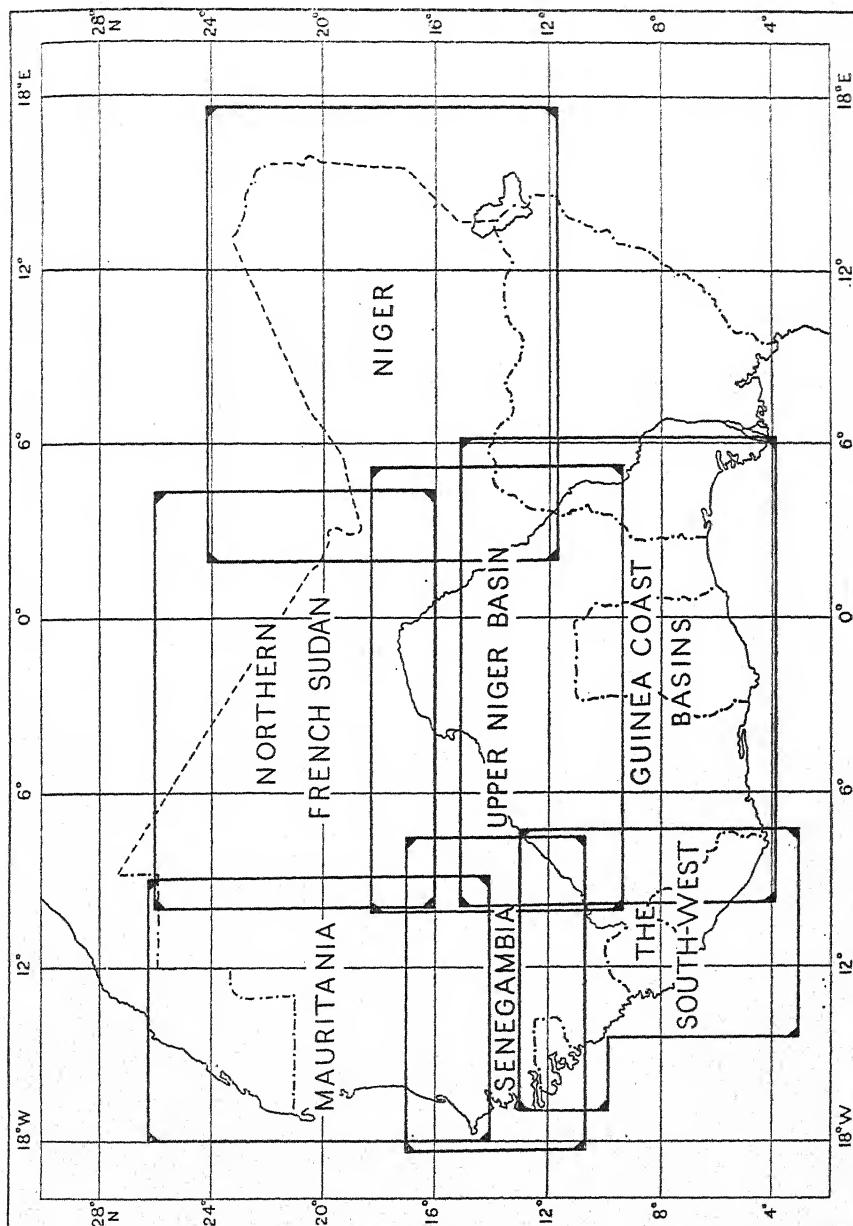


FIG. 7. Index to Regional Maps

are low plateaux, averaging 600 feet above sea-level, bordered on the west and south by a precipitous scarp 300 to 400 feet high in places; northwards they rise to the Hammada of Draa in the Algerian Sahara, and eastwards they fall to the depressions in the north of French Sudan.

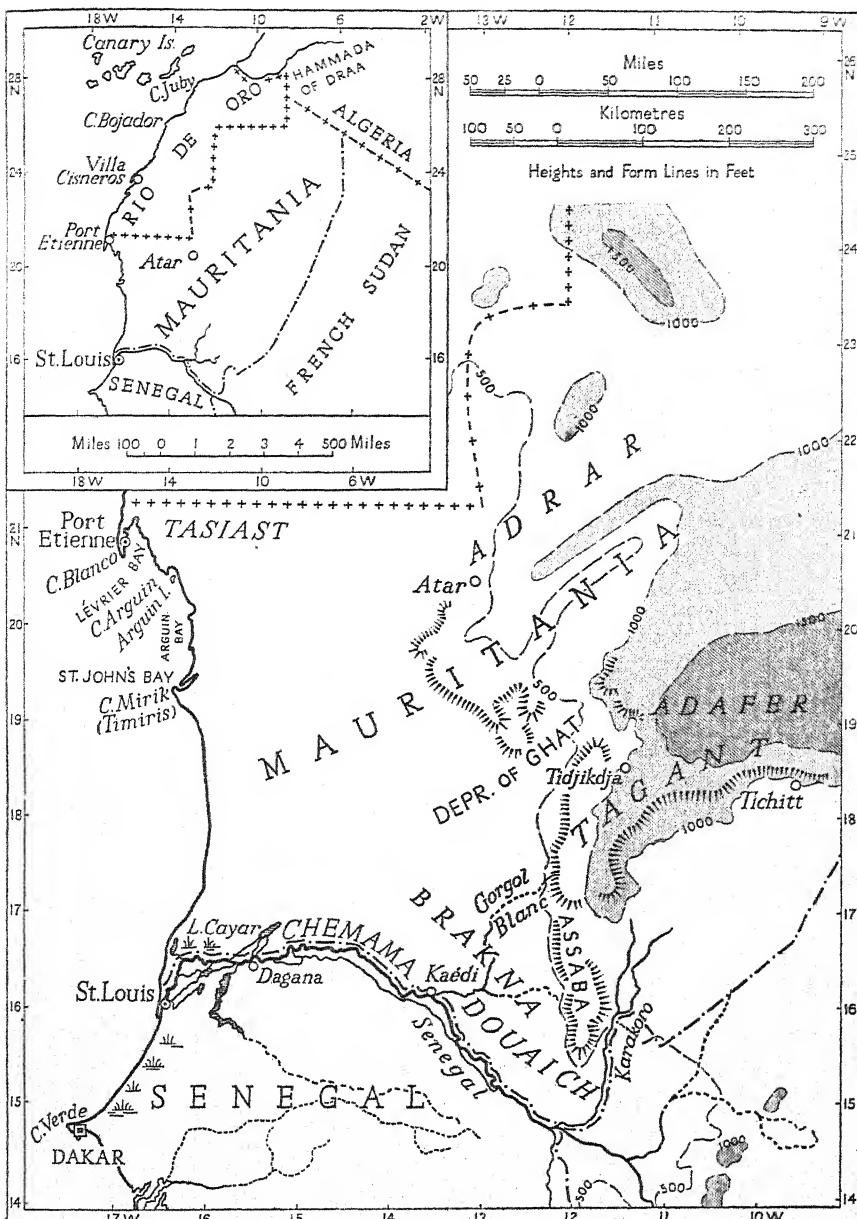
The Coast

The total length of the coast is about 425 miles, but between Cape Blanco in the north and the Senegal estuary in the south there are only two capes worthy of the name and no rivers of any importance. Port Etienne shelters in Lévrier bay behind the 20-mile-long peninsula which ends in Cape Blanco. Some 50 miles to the south-east Cape Arguin encloses another shallow bay to its east with three barren islands in it. Other groups of low islands lie off the coast, until, 80 miles farther south, Cape Mirik (Cape Timiris) is reached. This is nothing more than a low sandy peninsula, which juts out to the south of a shallow lagoon called St. John's bay. To the south of Cape Mirik the coastline, smoothed by the Canary current, is entirely devoid of harbours or islands. The shore is low and sandy, with off-shore shoals and heavy surf, and is backed by shifting dunes and by the salt marshes which yield one of Mauritania's few products.

The Coastal Plains

In Tasiast, east of Lévrier bay, there are low pebbly sandstone hills, but the clay which forms the rest of the coastal lowlands is largely covered with sand-dunes. These dunes have a fairly dense cover of tufty grasses and thorn-scrub in the south-west of Mauritania, but elsewhere they are barren, and, in many cases, still mobile. Between the ridges of the dunes the underlying clay is often exposed in long and relatively narrow depressions called *aftout* (or *gound* or *taieurt*): their pebbly surface is dry and hard for most of the year, but forms marshes after rain.

In Brakna and Douaich, the south-eastern plains, dunes are less in evidence. Here the clay flats are broken by low steep-sided hills and permanent marshes increase southwards. Shallow lakes form after the rains, and temporary streams, such as the Gorgols and the Karakoro, flow south to the Senegal. The strip of country that lies along the right bank of this latter river, between Dagana and Kaédi, is known as Chemama. Its low-lying plains are widely flooded each year between September and November, and at its western end is Lake Cayar. This, the only permanent freshwater lake in Mauritania, acts as a natural reservoir to the river, taking off the top of the flood and returning it

FIG. 8. *Mauritania*

later to the lower reaches. The floods also extend to the lowlands west of Dagana, replenishing the large areas of permanent marshland found there.

The Interior Plateaux (Plates 1 to 4)

East of the plains described above and roughly on longitude $12\frac{1}{2}^{\circ}$ W. the country rises by an abrupt scarp to higher ground formed by sandstone. Its average height is about 600 feet, but in places heights of over

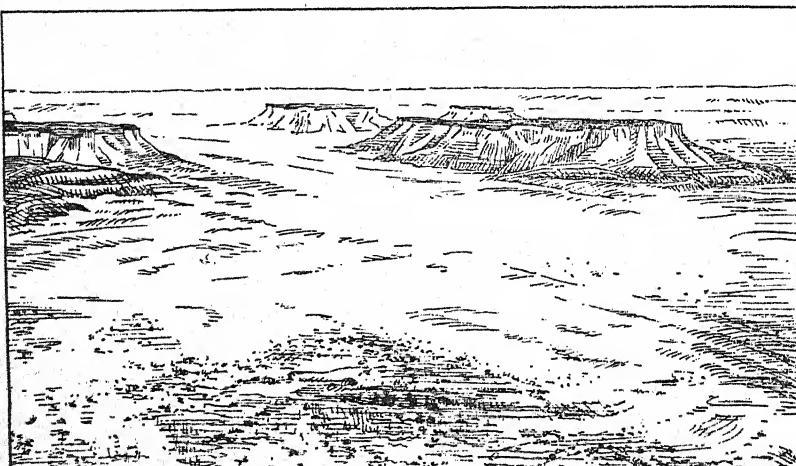


FIG. 9. *Mesas*

1,000 feet are reached. The sandstone acts as a natural reservoir, so that springs are frequent and pasture is plentiful in the ouadis; wells can be dug, and a few oases, such as Atar and Tidjikdja, support a relatively dense sedentary population. The open surface of the plateaux is, however, bleak and barren. Expanses of flat stony country known as *reg* (Plate 1) alternate with tracts of mobile dunes called *erg* (Plate 2), again aligned in a general north-east to south-west direction. The southernmost part of this high ground is called Assaba and lies between the Gorgol Blanc and Karakoro rivers. Assaba was once joined northwards to the larger plateau of Tagant, but is now broken into isolated flat-topped hills or *mesas* with steep sides (Fig. 9). Tagant in its turn continues north-eastwards to Adafer and northwards to Adrar, though south of the latter the western scarp has been eaten back eastwards and is broken by a tongue of lowland known as the depression of Ghat(Rhat). The high ground falls eastwards from Adrar into the depressions of El



1. *Reg*



2. *Erg*



3. *The Mauritanian scarp*



4. *Hammada*

Djouf, and, to the north, ground rises gradually to the stony plateau known as Hammada of Draa. Most of northern Mauritania is covered in dunes, but ridges and scarps of the older underlying rocks are frequently exposed.

SENEGAMBIA (Fig. 10)

The northern slopes of Fouta Jalon and the sandstone spur running east to Bamako lie roughly along latitude 12°, and from them the Senegal's main head-waters—the Bafing and the Baoulé—, and its main tributary the Falémé, flow north-west. They leave the high ground as they unite, and the Senegal, as the river is called below Bafoulabé, then meanders in a great curve to St. Louis and the Atlantic, enclosing the barren plains of Fouta and Ferlo. In the south-west of the region the Gambia river system also drains the northern slopes of Fouta Jalon, and there are other rivers, such as the Sine, the Saloum, and the Casamance, which rise on low hills in the wide coastal plains.

The Coast

The Cape Verde peninsula is the westernmost point of Africa. The coast to the north is one of smooth dunes; to its south it is indented by estuaries. On both sections there is a moderate swell and heavy surf as in Mauritania.

St. Louis, the capital of Senegal, lies on an island in the estuary of the river of that name. It is sheltered from the Atlantic by a narrow sand-spit that the Canary current has built southwards, across the river's mouth. In recent years the river has several times broken through to the sea at different points, but at present the spit is some 45 miles long and St. Louis lies 12 miles upstream from its southern point. Southwards from the estuary the coast stretches in a smooth curve to Cape Verde. It is backed by dunes which are over 100 feet high in some places and often covered with open scrub. No rivers reach the sea here, but temporary streams from Ferlo end in a string of lagoons and marshes behind the dunes. These swamps, called *seyanes* by the natives, are surrounded by oases of relatively dense vegetation known locally as *niayes*.

As the coast swings out to the Cape Verde peninsula reddish cliffs appear between the sandy beaches, and moderately high ground rises at their back to about 350 feet high behind Cape Verde itself. Rocky islands lie off the cliff-bound southern end of this peninsula and help to shelter the harbour of Dakar in Goree bay, but low sand-dunes reappear round the north and east of the bay. Interrupted by occasional

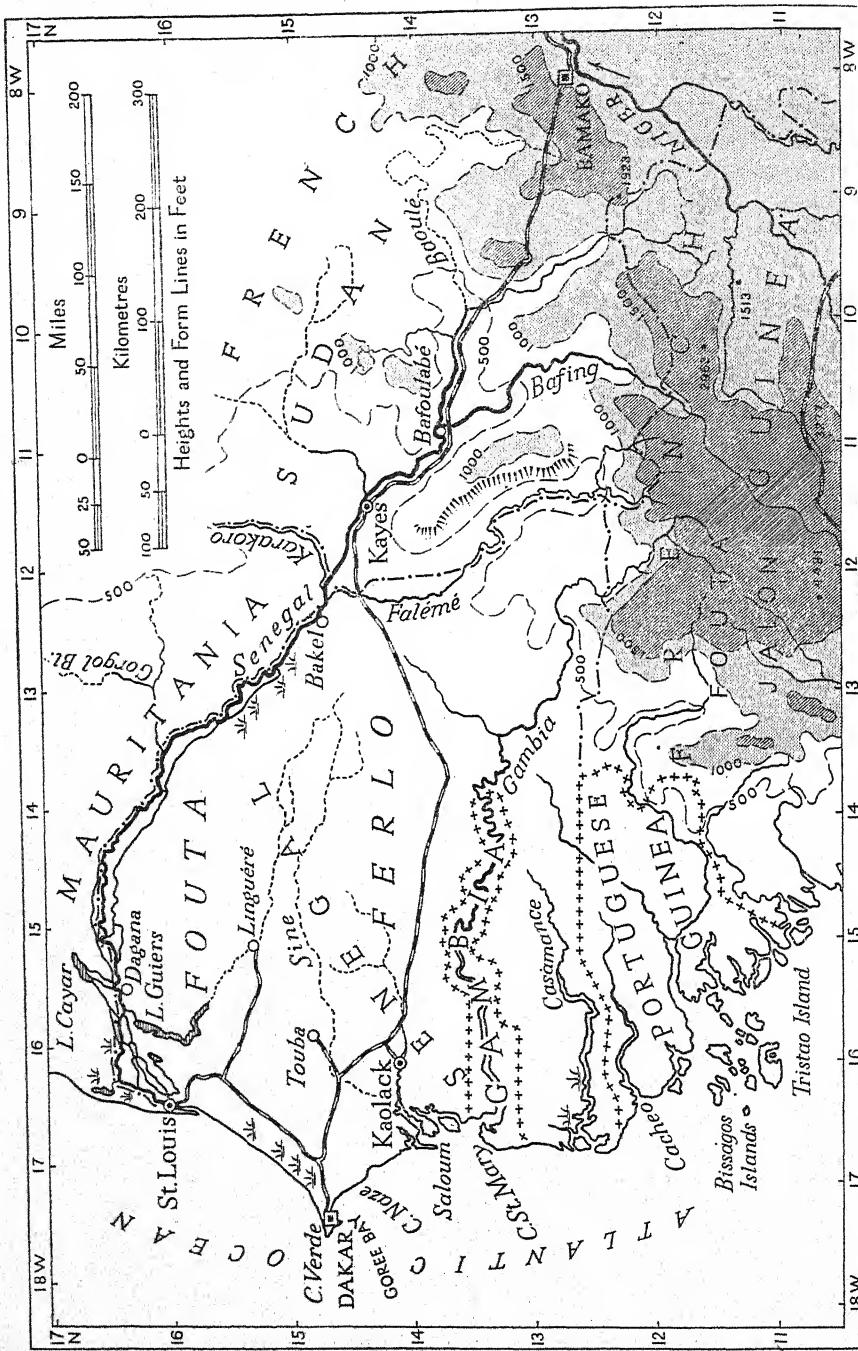


FIG. 10. *Senegambia*

reefs and backed by low wooded hills, this low coast continues to the Saloum estuary, the only cliffs of any height being the red lateritic slopes of Cape Naze.

The southernmost part of the coast of this region is broken by four large estuaries—the Sine-Saloum in Senegal, the Gambia, the Casamance in lower Senegal, and the Cacheo in Portuguese Guinea. The mouths of the two French rivers are screened by islands and are difficult to identify from the sea, but the Gambia and Cacheo are more open. All four are tidal and navigable for some distance, but their channels are variable and impeded by sandbanks. Low mud-flats, lined with mangroves (Plate 30) and intersected by a maze of tortuous creeks, make up most of the shoreline of this section of the coast and of the estuaries, but between Cape St. Mary and the Casamance there are some 70 miles of smooth sandy coast, more typical of northern Senegal.

The Coastal Plains

For 60 miles inland from the coastal dunes and the marshes behind them the surface of Senegal north of Dakar is much like that of Mauritania. Old dunes of an average height of 60 to 160 feet have been fixed by the vegetation. Their general alignment is from north-east to south-west with intervening clay strips, marshy and difficult to cross in the wet season. The featureless plains of Fouta and Ferlo inland from this dune country are practically desert, for their thin sandy clay is very infertile and so porous that water is only found near the surface in the few shallow depressions that cross them from east to west. The contrast with the fertile valley of the Senegal encircling them to east and north is very vivid.

Access to the Senegal from the sea is over a dangerous shifting bar, but the river is navigable for steamers as far as Kayes, 555 miles inland, according to the season and type of boat. Its lower course has so slight a gradient that the tide runs upstream for nearly 300 miles—half as far again as the length of the Thames—and when the river rises, as it does each year, floods are widespread, for high water is a dozen feet or more above low water. The top of this flood passes Bakel in September and has reached St. Louis by the end of October. By that time, however, its depth is much reduced, for it has replenished the subterranean water-table in Mauritania and Fouta. Much of it, too, has been taken off by Lake Cayar and Lake Guiers and by the many marshes and backwaters surrounding them. From Dagana to Bakel is 350 miles, and over the whole of this distance there are two

or three branches, parallel to the main stream and linked to it at intervals, enclosing long narrow islands. Above Bakel the Senegal is much interrupted by rapids, and in the foothills of Fouta Jalon its head-waters narrow between high rocky banks.

The surface of the coastal plains south of the Dakar-Niger rail-

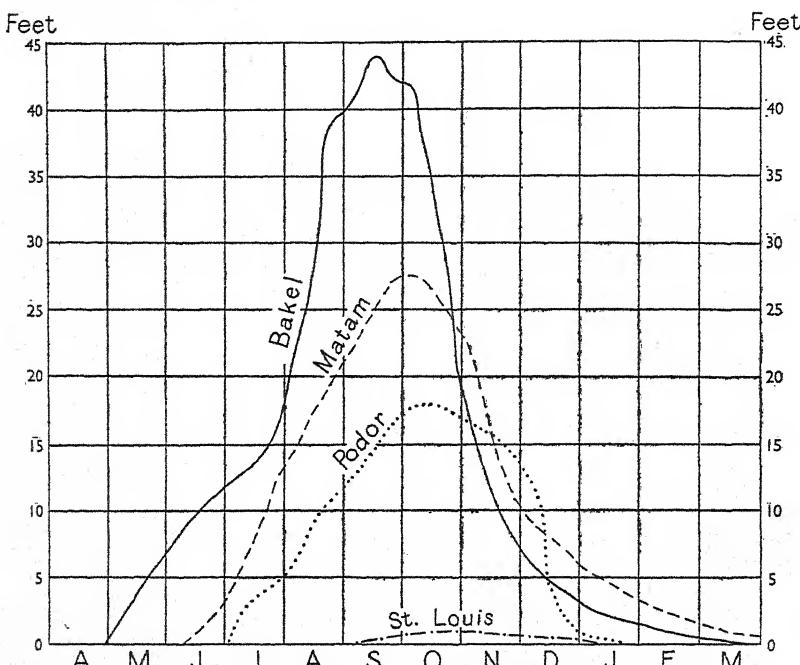


FIG. II. *The Senegal Flood by Months*

way is more diverse. The river valleys are, indeed, wide and flat, marshy and liable to floods. Vegetation is thick on these flats. From them short steep slopes lead up to low plateaux whose spurs and outliers often push close to the rivers themselves. On the level surfaces of the higher ground wide areas turn to loose sand in the dry season between December and March. Scattered ant-hills, often 5 or 6 feet high, dot the surface, and from it rough boulder-strewn ridges, usually covered with laterite, add complexity to the landscape.

No description of this region can afford to omit some mention of the seasonal changes wrought by the climate and the hand of man, though they are more fully described in later chapters. The lowlands of Senegambia are orchard-bush country, and they are also the main centre of the important West African ground-nut industry. By

January drought has shrivelled and seared the whole countryside; by March man has blackened it with his bush fires; by June rain has rejuvenated it and everything is fresh and green; by November man has dotted it with huge heaps of harvested ground-nuts.

Northern Fouta Jalon

The only high ground in Senegambia is found in the south-east of the region. It consists of spurs from Fouta Jalon extending north and north-west between the Gambia, Falémé, Bafing, and Baoulé systems. The spur west of the Bafing has a pronounced scarp overlooking the Falémé valley. As the lowlands are left behind, the valleys become narrower and falls appear, while the relief grows wilder and more picturesque, with tors and rocky massifs rising above deep gorges and narrow steep-sided spurs. The vegetation is denser, and in parts the tree growth thickens into forest.

THE UPPER NIGER BASIN

(Fig. 14; see also Fig. 17 for the head-waters)

The head-waters of the Niger, or, to give it its Mandingo name, the Djoliba, rise on the north-eastern slopes of Fouta Jalon and the Guinea Highlands. To such an extent is this great river the centre of the life of interior West Africa that its valley can well be considered as a region, even though its boundaries are not clearly defined except near its sources.

The Upper Niger (Plates 5 to 9)

The many tributaries forming the head-waters of the Niger flow from the semicircle of hills between Bamako and Odienné converging, like the ribs of a fan, on the main stream above the former town. In their upper courses these streams flow in narrow valleys below broken rolling hills and steep spurs. Since the main stream of the river flows on the north side of its valley, the northern slopes up to the Niger-Senegal divide are relatively steep, but on the south the foothills of Fouta Jalon are quickly left behind and the valleys flatten out into the vast monotony of the Niger plains. This remarkable flatness is characteristic of the whole of the interior. Rolling plains of laterite covered by grass or scrub stretch as far as the eye can see. Gallery forests line the rivers, but elsewhere trees are solitary or grow in scattered clumps. Outcrops of older rock form scarps, and granite tors frequently break the surface, while ant-hills abound. During the

rains marshes are widespread, and considerable areas near villages are cleared and cropped. These plains continue eastwards from French Guinea into French Sudan on either side of the Niger. Northwards dunes increase and orchard-bush passes gradually into desert scrub as the influence of the Niger floods is left behind. Southwards the ground is dotted with tors and broken by low scarps as it rises to the ill-defined Niger-Volta divide.

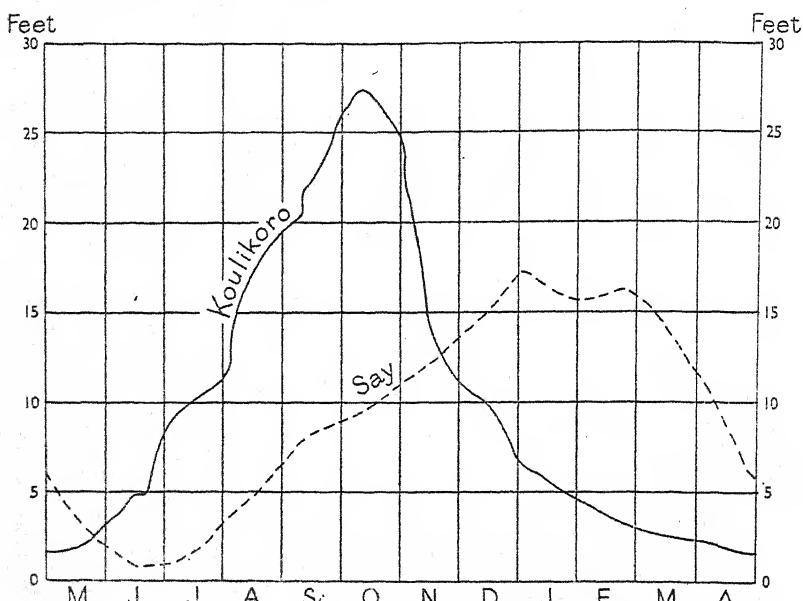


FIG. 12. *The Niger Flood by Months*

The distance from Kouroussa round the great arc of the Niger to the sea is 2,350 miles. Over the whole of that distance navigation is possible, though the extent to which steamers can use the river varies from section to section and month to month. Seasonal variations are due to the annual flood, but the peculiar feature of this Niger flood is the extraordinary length of time it takes in working its way down to the sea. The highlands in which the river rises receive between 10 and 15 inches of rain per month, at the height of the rains, from May to August. A colossal volume of water has therefore to be carried away downstream, and so greatly is it held up by the lakes and swamps of the middle course that the flood takes more than a year to reach the sea. By August the level of the water has risen a dozen or more feet at Kouroussa: the top of the flood reaches Koulikoro in October with

a 25-foot rise above low water, Kabara in December at the beginning of the dry season, Ansongo in February of the next year, and Gaya in June. At high water all the many rapids disappear, except those between Bamako and Koulikoro, but at low water steamers can only use certain reaches and canoes have to serve for transport.

Kouroussa on the Niger and Kankan on the Milo, at the limits of steamer navigation, lie 60 miles upstream from the confluence of the two rivers. From that point the Niger runs north-east to Bamako, being joined by several tributaries, of which the chief are the Tinkisso on the left bank and the Sankarani on the right bank. The hills to the north close in on the river as Bamako is approached, and the European quarter is built on a prominent outlier, overlooking the river. For the next 40 miles, to Koulikoro, the river is encumbered with rapids, and it is here that the Barrage des Aigrettes has been built for the great Niger irrigation scheme, and the Sotuba canal now enables steamers to avoid the rapids. Below Koulikoro the river is about a mile wide at low water, flowing some 20 feet below the flat plains on either side. At high water, however, a considerable stretch of country is flooded and river-side settlements, such as Ségou, which the Dakar railway is presently to reach, are therefore sited on rising ground. There are no major tributaries on this section until the Bani flows in at Mopti, 300 miles from Koulikoro, but for the last 100 miles many distributaries leave the river on its left bank and flow across the fens of Macina to Lake Débo.

This lake is the centre of the great 'inland delta' of the Niger (Fig. 13), which reaches from Diafarabé to Timbuktu, a distance of 240 miles. The geological origins of this area are described on pp. 52 and 53. On more than one occasion it has been invaded by the sea, but the history of the rivers which flowed into those seas, of their subsequent changes or captures, and of their final escape down the present channel of the lower Niger, is still a matter of discussion. A huge stretch of country, estimated at 38,500 square miles, or a little larger than Scotland and Wales together, is now annually flooded, and the lakes replenished. Most are shallow and enclosed by flat banks, but depths of at least 163 feet have been measured in Lake Faguibine which lies apart and to the north, and in many parts its banks are high. The whole area is marshland on which huge flocks of native sheep and cattle are pastured. Floored with fertile black soil, and seamed with a maze of creeks and backwaters, this area has rich possibilities, once the floods are controlled. The highlands of Bandiagara, rising close to the river between Mopti and Lake Débo, prevent extensive

flooding on the right bank, but nearer Timbuktu the floods are more widespread, and the lakes more numerous, on the east of the river.

Below Timbuktu the actual valley narrows to a mere strip of fertility as the Niger dwindles in volume. Its banks are low and sloping and its channel encumbered by flat swampy islands. On the north the dunes of the Sahara creep very close. On the south continue the same featureless plains, patterned with temporary watercourses and dotted with outcrops of older rocks. Of these the Takamadasset

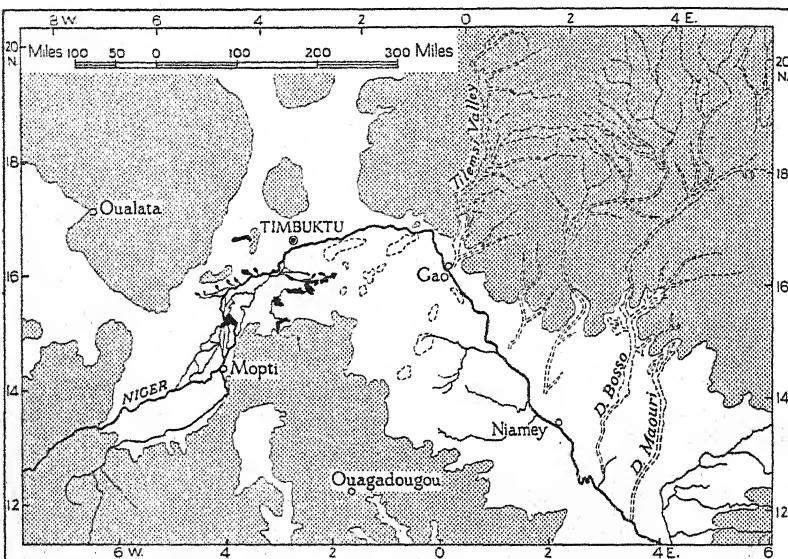
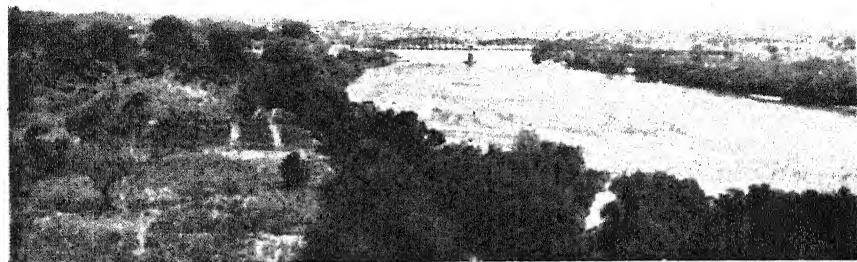


FIG. 13. *The Niger Depression*

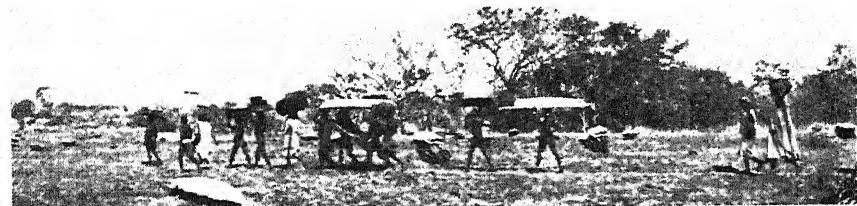
hills and Hombori mountains (Plate 8) are the most conspicuous. The latter are the highest point of the line of hard rock connecting the Niger-Volta divide to Adrar des Ifoghas, away to the north-east. This line of old sandstone forms a sill across the river above Bourem and forces its valley into a gorge only 500 feet wide.

The Middle Niger

Immediately below the gorge the river makes a sharp turn south-east to Gao and Ansongo. Downstream from the latter its channel is frequently broken by rapids, such as those at Labbezenga, and interrupted by rocks and islands. The flat lowlands on either side of the river are composed of sandstone, largely capped by laterite. Into



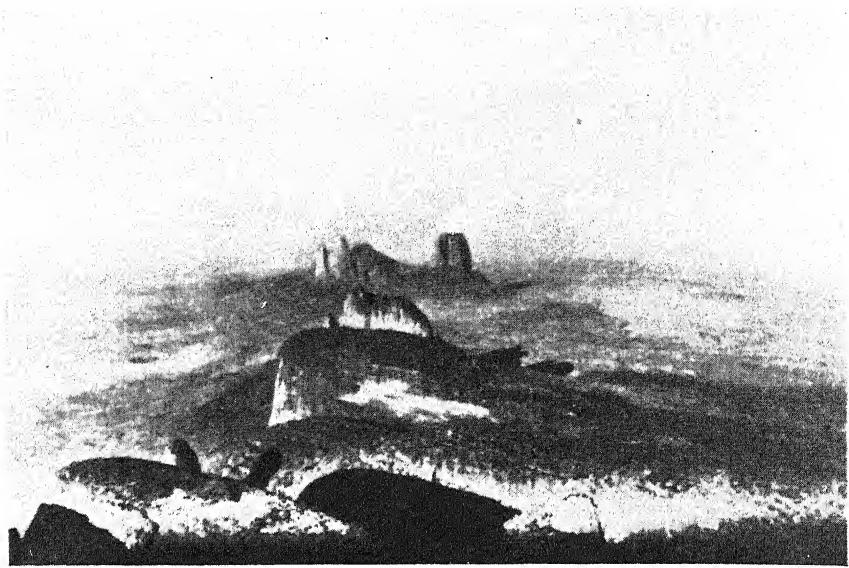
5. *The Niger at Kouroussa*



6. *Termite mounds in the savanna*



7. *Foot-hills of the Guinea Highlands near Guékedou*



8. *The Hombori mountains*



9. *The Niger at Niamey*

these plains the Niger and its tributaries have eaten wide valleys with well-defined margins. The rivers now run 10 or 20 feet below the general surface of the original plain, and where they swing close against one side of their valleys their banks are steep and rocky. The longer seasonal watercourses joining the Niger from the west rise in the Moshi highlands: those on the east are mainly local ouadis, but some, draining from Adrar des Ifoghas and Aïr, are remnants of rivers comparable to the Rhine and Ohio. In these larger valleys shallow wells will tap water almost everywhere, though surface water may only flow for a few days each year.

The low-lying country between the Moshi highlands and the middle Niger is often known as Gourma. Its lateritic plains, dotted with tors and thorn-scrub, are more than usually swampy in October and November owing to the underlying granite. Near the Niger static dunes appear and continue south-eastwards into Borgu, which is very similar to Gourma. Southwards the country rises to the divide which is still considered as the southern boundary of the region. It is here so indeterminate that rivers flowing to the coast often rise in the same swamp as tributaries of the Niger, but bolder country is formed by the scarps limiting the Atakora highlands, by the tors near Bouay, and by the high ground along the Nigerian border south of Nikki.

NORTHERN FRENCH SUDAN (Fig. 15)

The country north of the Niger is little known away from the caravan routes, and almost uninhabited. Broadly speaking, featureless plains make up the western half, while in the east the Tilemsi valley separates the broken surface of Azaouad from the highlands of Adrar des Ifoghas.

The Western Plains

The scarp that limits the Mauritanian plateaux enters this region in the extreme south-west and curves from Tichitt through Oualata to Néma. These three are the chief settlements in a line of oases strung out along its foot. Routes to the north and east use the few re-entrants to reach the higher ground above, which spreads, dead and featureless, into the Sahara. From Oualata across El Djouf to Bir el Ksaib, and east to the oasis of Araouane (300 and 250 miles respectively), there is little pasture, no life of any kind, and no wells. As the surface gradually falls northwards, wastes of mobile dunes alternate with broken rocky platforms and flat pebbly plains. East of Bir el Ksaib is

a low scarp called El Krenachich, overlooking a depression to its north. Here in the very heart of the western Sahara is the oasis of Taoudenni. The hammada and clay lowlands which surround it are hemmed in on the north by the dunes of Erg Chech, and on the east by the flat reg of Tanezrouft.

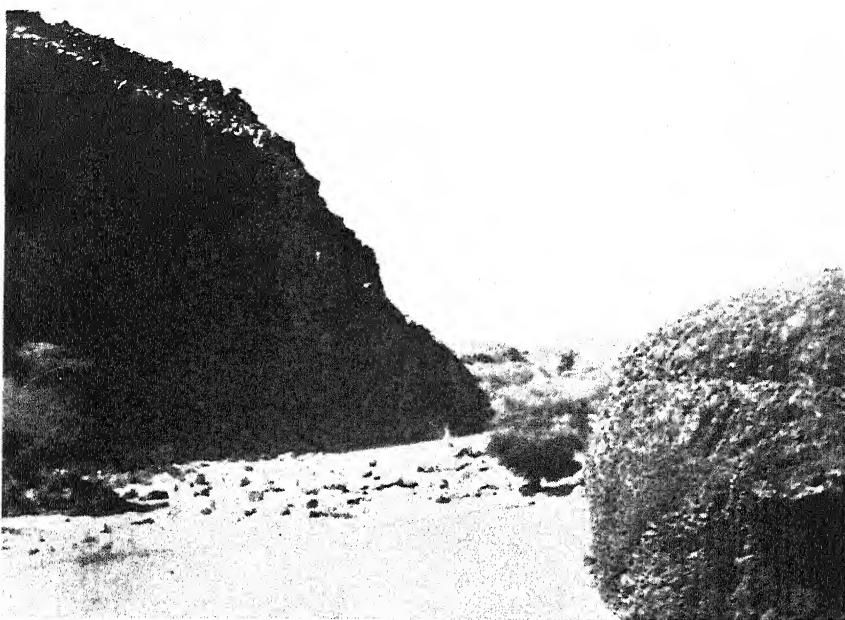
Azaouad

The country east of the Taoudenni-Timbuktu track is better known and more inhabited, for water is more abundant, and, though most wells are impermanent, some are able to support a small sedentary population. South of latitude 18° the slightly undulating plains are composed of stabilized dunes covered with relatively dense vegetation. North of this latitude, in the district known as Azaouad, there are large areas of mobile dunes with outcrops of the older rocks rising through them as low hills. The east of the district is a dissected plateau of no great height, whose wide shallow valleys are almost invariably bordered by a steep scarp. The exposed higher parts are desolate, barren rock with pockets of sand, while the ouadis are largely filled with dunes. On the rare occasions when rain has fallen, water may flow in these ouadis for a few hours, and marshes form between the dunes. Though the marshes are also usually short-lived, patches of hardy scrub, used by the nomads for their stock, indicate that the water-table is near the surface. Indeed, shallow wells are frequent and often permanent, except where the underlying rock is limestone.

The Tilemsi Valley and Adrar des Ifoghas

Azaouad is bounded on the east by a series of low scarps falling to the Tilemsi valley, a huge depression used by the main route from the Sudan to the Mediterranean. The valley at one time held a major river flowing south to the gulf of Guinea, but to-day surface water is rare. South of Tesalit the valley lies like a shallow trough between Azaouad and Adrar des Ifoghas, but near the Algerian border the surface rises to broken country, before falling north and west into the monotonous plains of Tanezrouft.

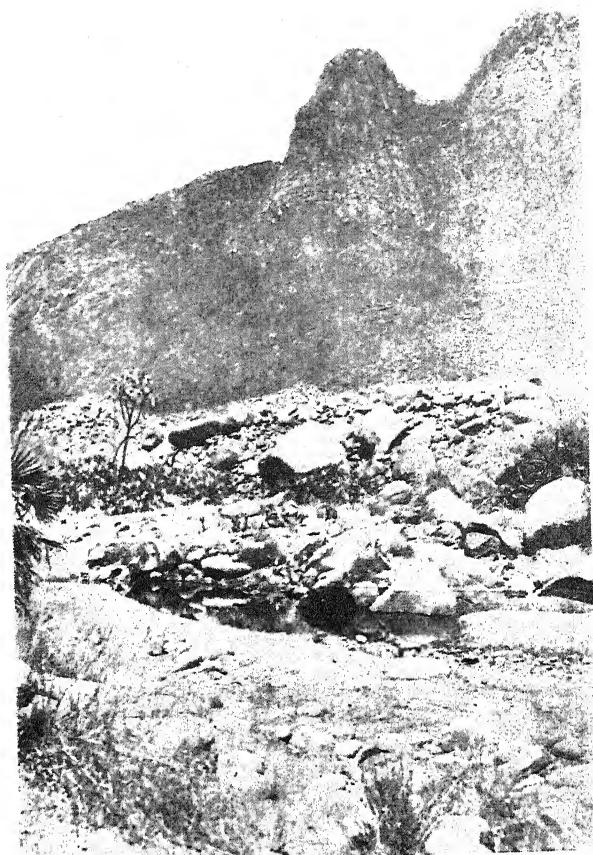
Eastwards from the valley the ground rises rapidly, and often by sheer cliffs, to the confused and rugged mass of Adrar des Ifoghas. This plateau is the end of a spur running south-west from Ahaggar, and has an average height of 2,000 feet with peaks rising to over 3,000 feet. As most of the higher ground lies to the west, the contrast with the Tilemsi valley is very striking: stark jagged mountains dominate



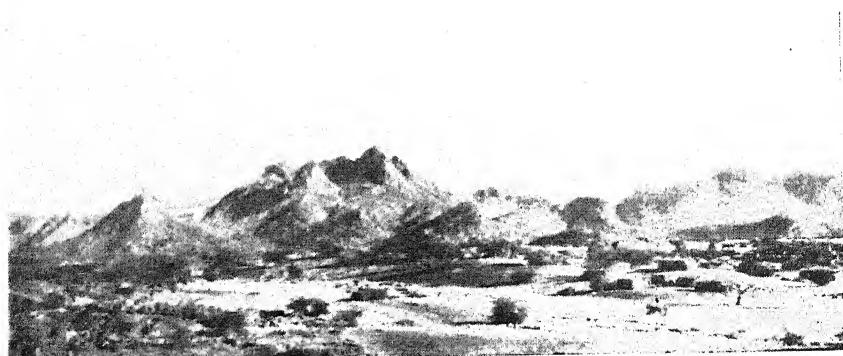
10. *Timia* gorge



11. *Timia*



12. *An Aür kori*



13. *The Aguellal mountains*

tortuous gorges whose beds are littered with piles of rocks. These highlands attract a small but regular rainfall in August and September, so that thorn-scrub manages to grow in soil pockets, and brief but violent torrents replenish the rock pools sheltering under the steep sides of the ouadis.

NIGER (Fig. 16)

An area of desert and semi-desert lies east of the middle Niger valley, broadly corresponding to the political territory of Niger. This region is roughly 1,000 miles from east to west and 500 from north to south. It consists of two wide lowlands lying on either side of the Air mountains, from which rather broken country runs southwards to the Bauchi plateau in Northern Nigeria.

The Western Lowlands

Throughout the lowlands lying in the west of the region there is a monotonous regularity of feature. Whether the underlying rock is sandstone, limestone, or clay, the strata are mainly horizontal, and, in the south, usually capped with laterite. These lowlands have been eroded by former rivers, of which the largest was that which is known to-day as the Dalol Bosso. The present surface, therefore, consists of a network of wide valleys, 20 to 30 feet deep, with abrupt sides. Where the network is close little remains of the original surface, except a few low mesas, but more often the valleys are separated by large expanses of barren plains, dusted with dunes and scattered with poor open scrub. On the other hand, the subterranean water-table is never far from the surface in the valleys, so that grass and thorn-scrub grow freely, and shallow wells can be dug. Unless the rains have been abnormally light, surface streams flow in all valleys for a few hours once or twice every year. Many parts of the valleys have been invaded by dunes. They often completely obscure the bordering scarps, and pond back the seasonal torrents to form temporary marshes, whose duration depends on the nature of the subsoil.

Dunes increase to the north of latitude 16° both on the mesas and in the valleys, until, on latitude 18° , a low scarp is reached, falling to the Tesellamane depression. This node of valleys from Ahaggar and Air is a vast clay lowland in which floods are widespread and pasture abundant from August to October after the rains. But, as the ground rises to the surrounding highlands, dunes reappear between the valleys.

The Air Mountains (Plates 10 to 13)

The tongue of highlands known as the Air or Asbine mountains is a low sandstone ridge between 1,000 and 2,000 feet high. On this base lava, and exposed igneous rocks, form the higher ground, which rises between 3,000 and 4,000 feet, either in tumbled confused masses or in isolated peaks.

From the wells of In Azaoua on the northern border barren plains rise gradually southwards, furrowed by ouadis draining west and interspersed with massifs of granite. The main mass of the mountains has its northern edge 60 miles to the south of In Azaoua and stretches south as far as Agades, a town of about 2,000 inhabitants, which still retains traces of its former importance as a trade centre. Most valleys drain west or south-west to Tesellamane, but a few lose themselves eastwards in the dunes of Ténéré. These Air ouadis, or *koris* as they are known locally, are usually wide and sandy with frequent wells and rock-pools, and in this they present a remarkable contrast to the rugged desolate surface of the mountains. From August to October sudden floods sweep down, but, though they are extremely violent, they are short-lived and quite irregular. A peculiar feature of this highland is the steepness with which the mountains rise from the valley floor (Plate 10). This makes movement difficult except along the ouadis, and even there frequent scarps are met with, the result of the faulting that accompanied volcanic action. Entry to the mountains is only easy in the south, where the high ground falls away in low hills. To the south of Agades is a large depression whose general drainage is from east to west into the Irazer Oua-n-Agades, one of the main feeders of the Dallol Bosso. Floods are widespread after the rains.

The Eastern Lowlands (Plates 14 to 17)

East of In Azaoua the northern boundary of Niger follows a col connecting Ahaggar to Tibesti in French Equatorial Africa. The lowlands of Ténéré lie south of this col, and over their 120,000 square miles dunes and scattered tors form the only relief. In the western half wells are non-existent. In the eastern half, or east of longitude 12° E., routes from Nigeria to Libya find water at reasonable intervals, but only at a few places, such as Chirfa, Fachi, and Bilma, is there a sufficient quantity to support a settled population. Though the country bordering the caravan routes has been roughly mapped, most of this area is still unexplored. Existing maps, therefore, are

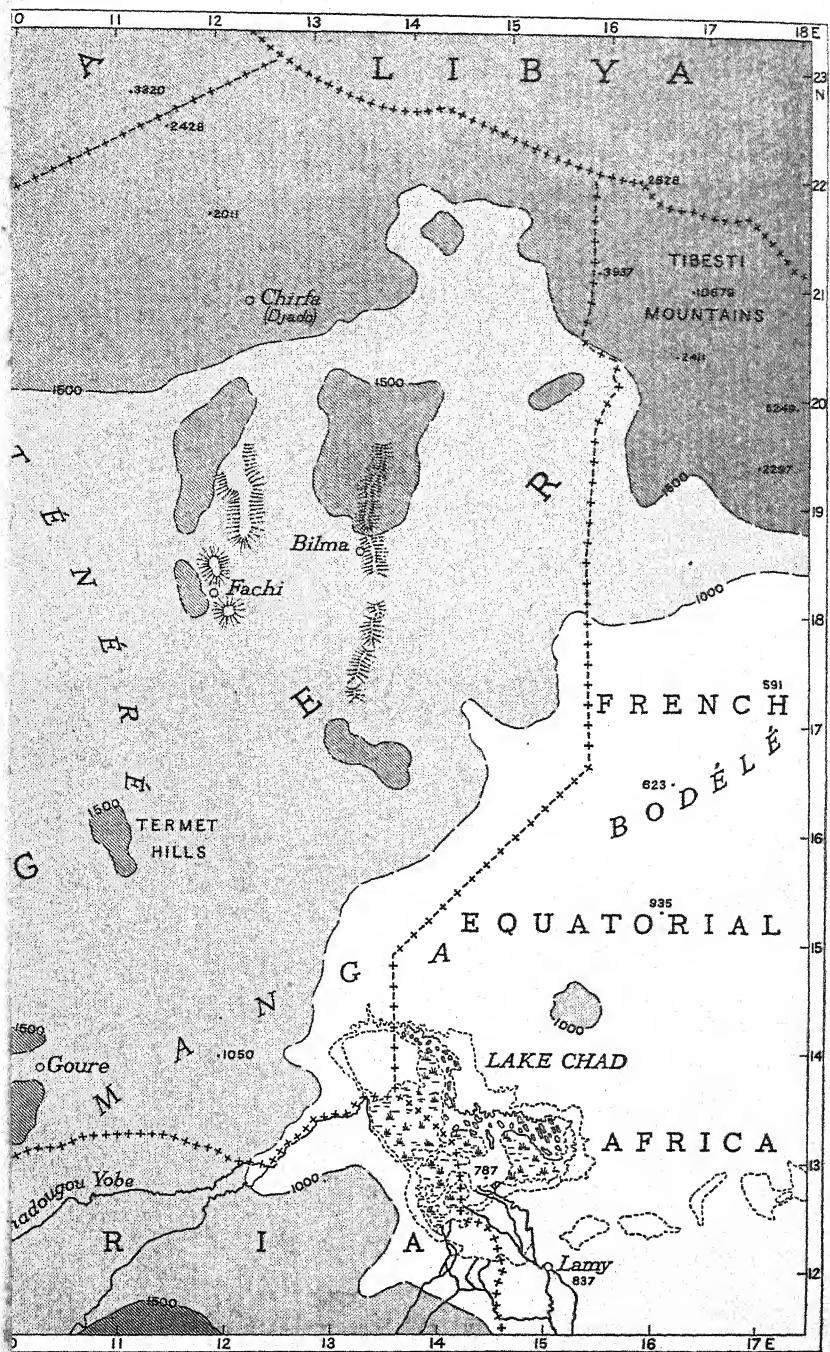


FIG. 16. Niger





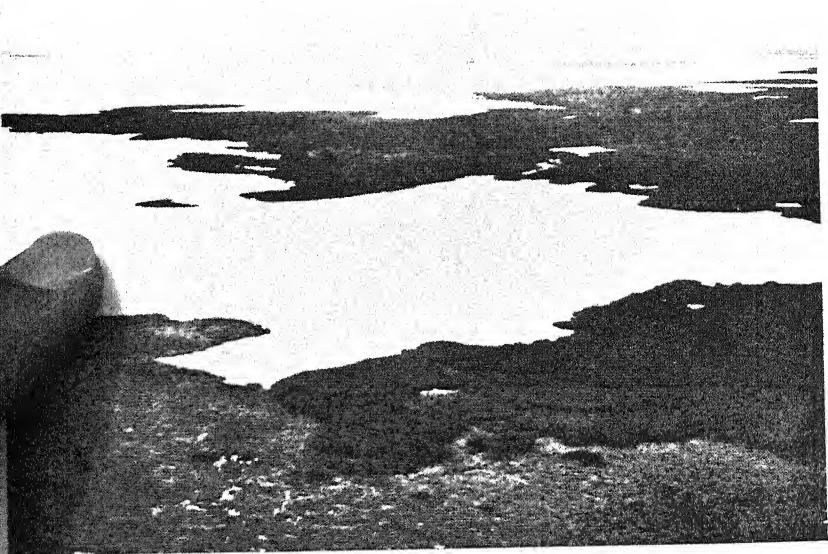
14. *The Tidjeddi scarp*



15. *The Termet hills*



16. *The Oasis of Dibella*



17. *Swamps of Lake Chad*

not reliable guides to the topography and many relief features remain unmarked.

The flat plains of Manga lie south of Ténéré and fall gradually eastwards to Lake Chad. Here and there low hills rise above the general level of the surface (Plate 15), and valleys are usually wide, shallow troughs whose steep edges are again often masked by sand. Depressions holding seasonal natron lakes are common.

Only the extreme north-west of Lake Chad lies in French West Africa. Fed by only one main stream, the Komadougou Yobe from Nigeria, its appearance changes with the seasons. Like the river, the north-west of the lake is almost completely dry by the end of February: only a few shallow pools are to be found on the mud-flats separating its many reed-covered islands. By August the river is a raging torrent, and many parts of the lake are then covered by a few feet of water. The area so covered varies very considerably from year to year, according to the rainfall in Northern Nigeria.

The Aïr-Bauchi Col

The more varied country linking Aïr to the Bauchi plateau is more densely populated, better known, and more accurately mapped than other parts of Niger. In the south-west are the plains of Tahoua which, like the country to their west, have been eroded into isolated mesas. As in so many parts of southern Niger, the villages are usually sited for defensive purposes on the higher ground. Since the plains are mainly limestone, this means that settlements are often far from water, for wells are only found in the valleys. The plateau is bounded on the east by a scarp, between 100 and 300 feet high, running north to south roughly along longitude 6° E. For thousands of years sand has been piled against this scarp by the prevailing north-east winds, and a narrow desert-like strip of uninhabited country results. Though it covers a relatively small area in the south, this sand extends north-east as far as the Tessaoua-Agades track, on which it causes many bad sections. The higher ground east of the track, the district of Tagama, is composed of sandstone, through which shallow valleys have been eroded to the underlying clay. This sandstone terminates northwards in the Tidjeddi scarp overlooking the Irazer Oua-n-Agades depression, and disappears southwards under the clay plains which surround Gangara. Much of the rolling country round Tessaoua and Zinder owes its relief to dunes which have now been fixed by vegetation. Here and there scarped clay plateaux rise through these dunes, and east of Zinder there are numerous granite tors forming islands in

the sandy plains. The whole area has a heavier rainfall than the rest of Niger, and this affects its appearance in two ways: first, a considerable growth of crops is made possible, so that much of the natural bush has been cleared; and second, shallow permanent lakes are to be found along the Nigerian border, though their depth and extent is very variable. Rolling sandy plains continue southwards into Nigeria, rising gradually to the rougher country of the Bauchi plateau, whose precipitous southern and western edges overlook the Benue and Niger valleys.

THE SOUTH-WEST (Fig. 17)

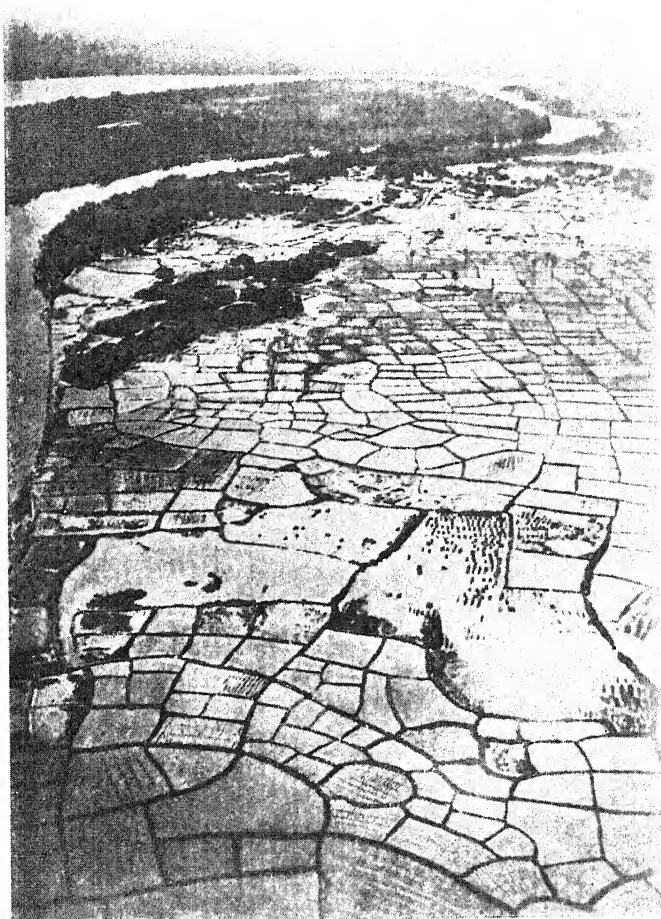
The general direction of the shore-line between Cape Roxo and Cape Palmas is from north-west to south-east. Most of the coast is low and swampy, but the coastal plains everywhere rise quickly to Fouta Jalon and the Guinea Highlands.

The Coast (Plates 18 to 21)

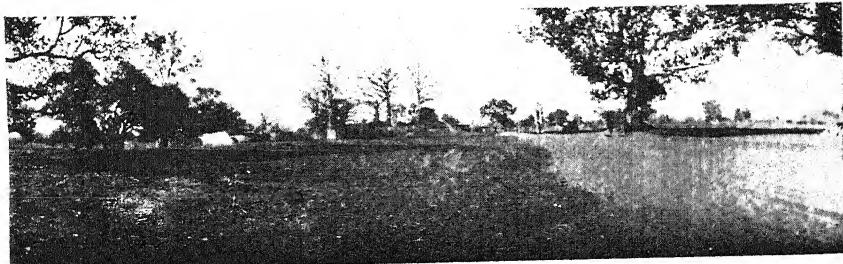
The northern half of the coast, from Cape Roxo to Sherbro island, is broken by estuaries of varying size and importance. All save the Sierra Leone river, on which Freetown stands, are silted up and made dangerous for navigation by sand-banks. Their mouths are often hidden by islands, and the mud-flats bordering them are usually lined by dense mangrove thickets.

The largest of these estuaries is the mouth of the Corubal river in Portuguese Guinea, and off its entrance lies the low Bissagos archipelago. The north of French Guinea has two wide estuaries, the Compony and Nunez rivers, the former protected from the open sea by the island of Tristao. Thirty-five miles southward from the latter is Cape Verga, whose sheer cliffs form the only prominent feature on the coast of French Guinea. South of this headland a swampy, mangrove-clad shore continues in a flat curve to Cape Sierra Leone. The north of the curve is broken by the river Pongo and by Sangarea bay. Almost in the centre the remnants of a subterranean volcano rise to form the Los islands, sheltering the peninsula on which Conakry has been built. The coast to the south of this port is intersected by many small creeks as far as the southern border of French Guinea, but thence a smooth shore-line runs to the Sierra Leone river, interrupted only by the estuary of the two Scarcies rivers.

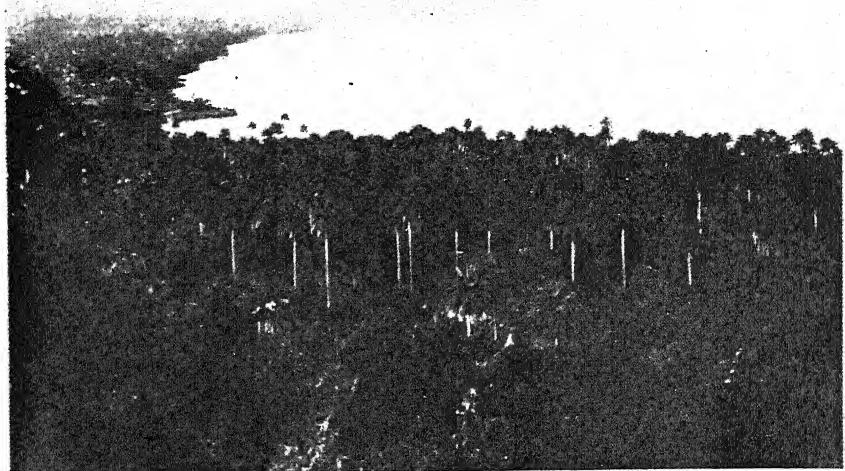
The mountains which give their name to Sierra Leone dominate Freetown from the south and are the most prominent landmark along



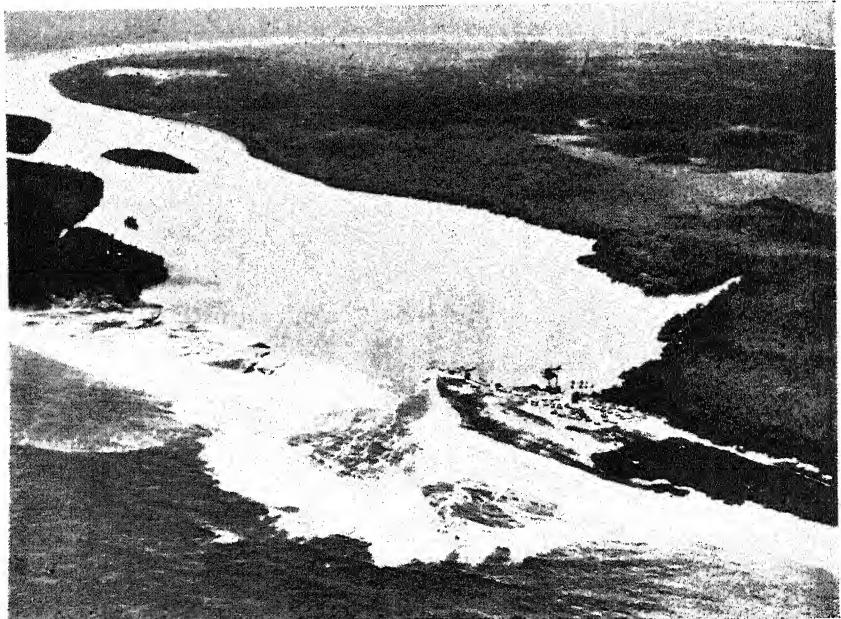
18. *South-west lowlands in flood*



19. *A village in Senegal*



20. Forest near Conakry



21. The estuary of the Cavally river

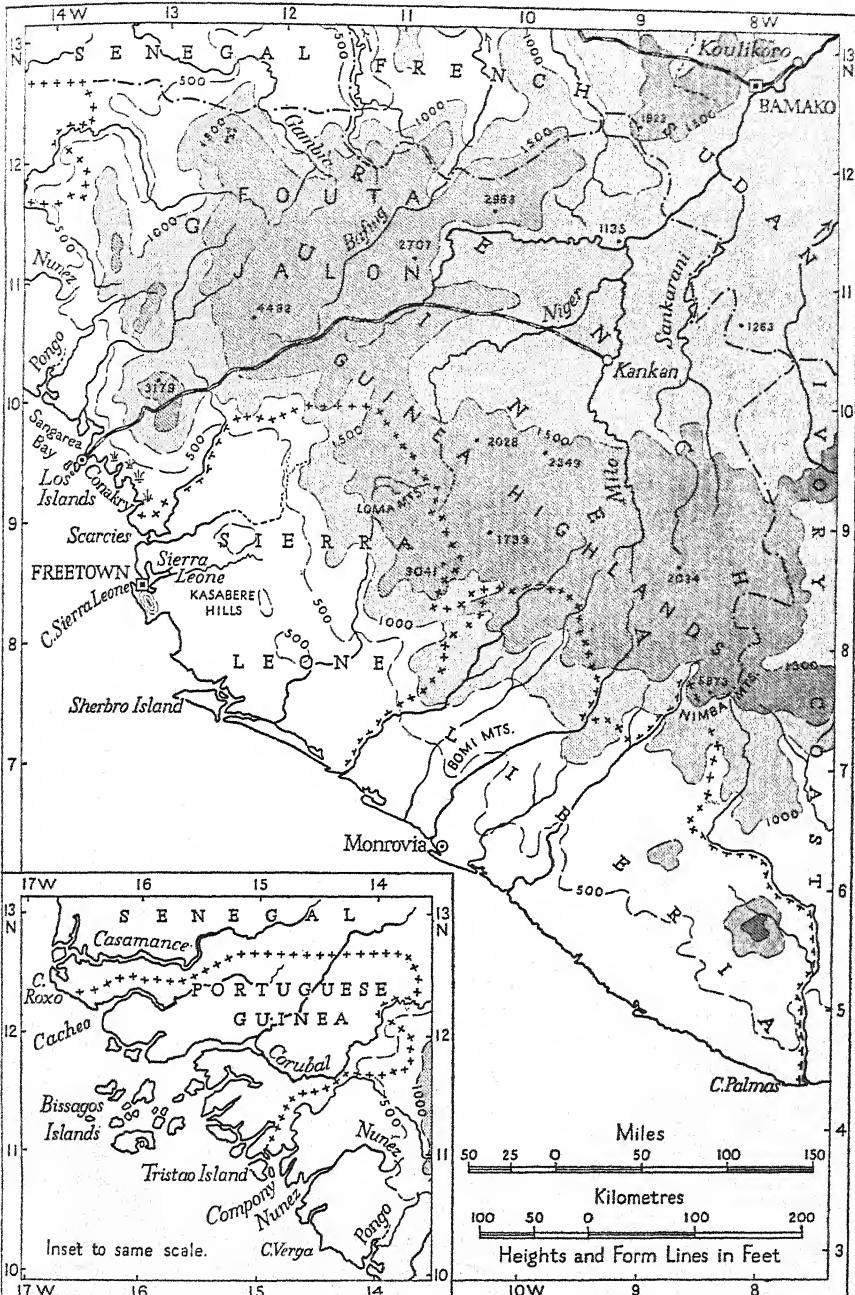


FIG. 17. *The South-West*.

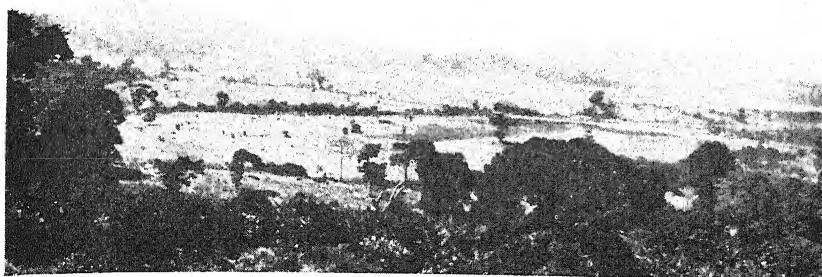
the whole of this coast. Their wooded slopes rise to over 2,500 feet. Southwards, as far as Sherbro island, the coast is still one of estuaries, but thence mile after mile of low scrub-covered dunes stretch to Cape Palmas. Their monotonous regularity is relieved only by a few low headlands and narrow river-mouths, or by isolated hills that rarely exceed 100 feet in height. Along almost the whole of the coast heavy surf has thrown up a dangerous bar and strong currents have built sand-spits which enclose lagoons and creeks parallel to the shore (Plate 21).

The Coastal Lowlands

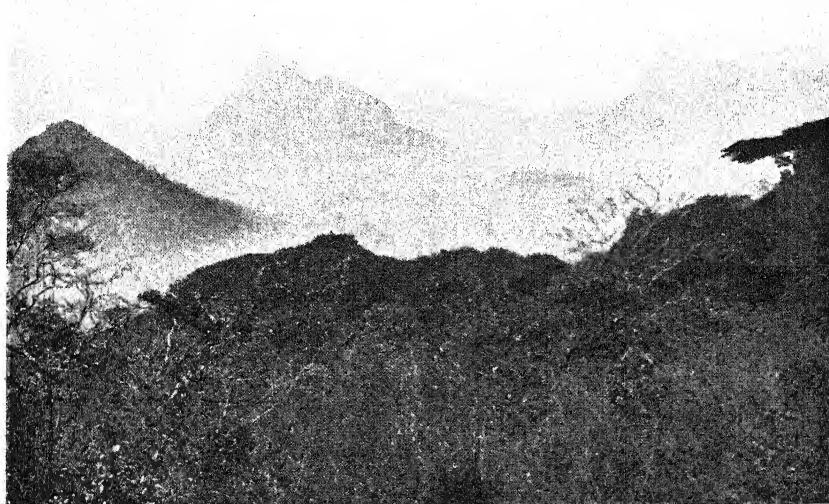
Behind the coastal dunes and mud-flats runs a low plain. This is interrupted by outliers of the highlands which lie behind and rise at varying distances inland by well-defined but irregular steps. In Portuguese Guinea and the north of French Guinea the lowlands are 50 to 200 miles wide, but they narrow to a bare score of miles behind Conakry. In Sierra Leone and Liberia they widen again to as much as 50 miles. A number of sluggish rivers wind across these plains, and though they are interrupted by rapids and low falls, the gradient is so slight that flooding is general after the rains (Plate 18). The alluvial soil composing the greater part of these plains is fertile, so that many plantations have been cleared, especially in Sierra Leone. Even so, the largest part of the lowlands in all four territories is still covered with forest or secondary bush, except where there are rocky outwashes and patches of laterite, too poor to support more than open grassland and bush. Probably laterite once formed a continuous platform round the base of the highlands, but these patches are all that erosion has left along its edges. Nearer the highlands it is still extensive, although the rivers have carved deep valleys in it. Its abrupt margin marks the first step up out of the lowlands.

The Highlands (Plates 22 to 25)

The circle of high ground surrounding the upper Niger basin has already been mentioned earlier in this chapter. Fig. 17 shows that there are two distinct highland masses, Fouta Jalon and the Guinea Highlands, linked by a relatively narrow col just south of the Conakry-Kankan railway. Both lie almost entirely in French Guinea but extend spurs north-east into the neighbouring French territories. A tongue of high ground runs south-west from the former almost to Conakry, and spurs from the latter enter Sierra Leone and Liberia. Rising from the coastal plains are such outliers as the Bomi mountains,

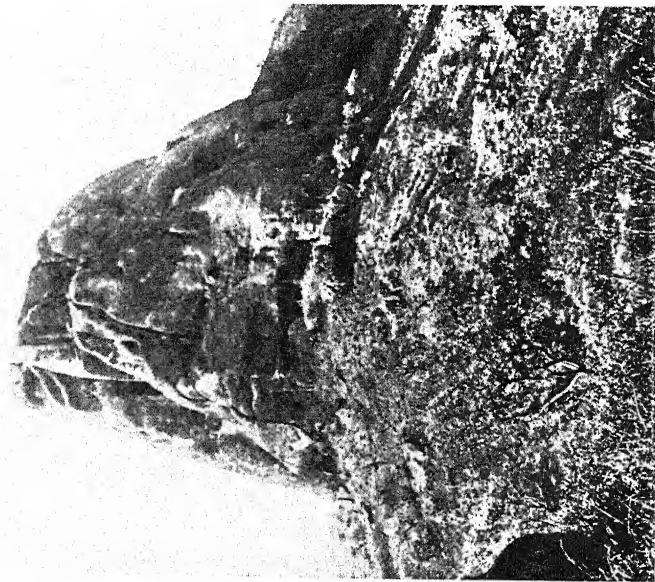


22. *Fouta Djalon countryside*

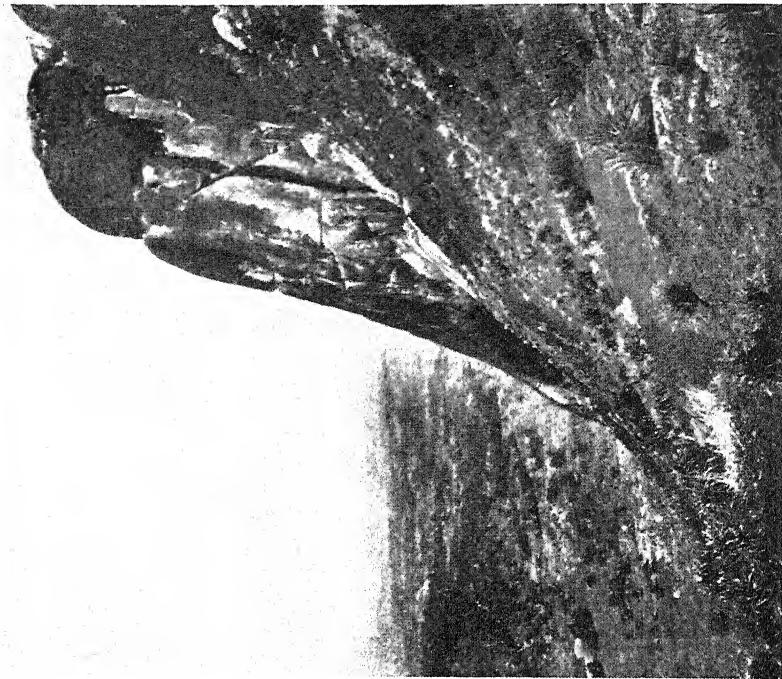


23. *The Guinea Highlands*

24. A granite tor



25. The coastal plain from the Fonta Falon scarp



north of Monrovia, and the Kasabere hills, 70 miles east of Freetown, in Sierra Leone.

In general the highlands are rolling sandstone plateaux between 2,500 and 3,000 feet high, with isolated tors and domes of bare rock rising several hundred feet above the general level. The major heights are nearer the steep seaward edge: more gentle slopes, prolonged by low hills, fall inland to the Niger plains. Over most of the plateaux open savanna is the rule, and forest is only dense in the valleys. As on the laterite below, the sandstones along the south-western edge have been much eroded and igneous intrusions exposed; faulting has also taken place and volcanic matter been erupted. Deep forested gorges result, with bold scarps, isolated sandstone blocks, and mountains which often rise sheer for many hundreds of feet (Fig. 21, sections 3 and 4). So confused and abrupt are these western slopes that in places they give an impression of mountain ranges. This is especially so in three regions—behind Conakry, in the Loma mountains of Sierra Leone, and in the Nimba mountains in the extreme south of French Guinea.

THE GUINEA COAST BASINS (Fig. 20)

South of the Niger basin West Africa is drained to the gulf of Guinea by rivers whose courses are, broadly speaking, north to south. The chief of these are, from west to east, the Cavally, the Sassandra, the Bandama, the Comoé, the Bia, the Tano, the Pra, the Volta, the Mono, and the Ouémé. The descent from the southern divide of the Niger basin is made by a series of steps so gradual as to pass almost unnoticed, save for the rapids in all rivers. There are, however, three more hilly areas: one in the west of the Ivory Coast, one in the west of the Gold Coast, and one in Togo. The whole of the coastline is beaten by heavy surf, and much of it is ringed by lagoons.

The Western Basins (Plates 26 to 29)

The coastline of the Ivory Coast has two quite distinct sections, one on each side of Fresco. Westwards a high rocky coast corresponds to the more mountainous country behind, while eastwards rocky headlands disappear and a low coast is everywhere fringed by an exposed sandy beach—the *cordon littoral* of the French. This beach, built by currents and surf, varies in height from 5 to 150 feet, and its seaward slopes are usually steeper than those to landward. Behind it lie a string of lagoons, of which Tadi, Ebrié, and Aby are the largest, stretching for nearly 200 miles along the shore. They are linked by small streams,

which in some cases have been, or are being, canalized. Mud-banks, sand-banks, and flat wooded islands break their surface, and their northern shores still show signs of the former coastline. Though at long intervals floods may force temporary breaks and join the lagoons to the sea, the Aby lagoon alone has a permanent opening, and only two rivers, the Bandama and the Comoé, have direct access to the sea. Eastwards into the Gold Coast, lagoons are absent from Axim to the mouth of the Volta, but the coast is still beaten by heavy surf and without any natural harbours.

In the four valleys of the Ivory Coast heavily forested plains extend some 200 miles northwards from the sea, but near Bouaké a V-shaped spur of savanna comes southwards between the Bandama and Nzi rivers (Fig. 38). The surface of these plains is so flat that all rivers have numerous large meanders, and, from July to November, floods are widespread. In spite of the small gradient, however, rapids are frequent.

From these lowlands numerous hills rise a few hundred feet like islands from the forest, while Oroumba Boka, whose highest points are over 1,500 feet, is a prominent massif south of Dimbokro. There is also mountainous country in the south-west, and a hilly area in the south-east of the region. In the south-west the Guinea Highlands enter the Ivory Coast. From the Nimba mountains two confused masses of high ground extend, one eastwards towards Man (Figs. 18 and 22), and the other southwards, on either side of the Liberian border. The latter feature reaches to within 50 miles of Cape Palmas. Along it there are heights of over 2,000 feet, and the Cavally and its tributaries have eaten deeply into it. In the south-east the broken and forested Ashanti hills run from Bondoukou to Accra, and narrow the coastal lowlands to a few score of miles north of the latter. Their northern slopes, overlooking the Volta plains, are abrupt. The southern slopes, though less steep in general, have been deeply eroded by the Gold Coast rivers; they are broken by steep ridges and scarps, and there are many prominent isolated hills. The low-lying country near the rivers is swampy for most of the year and the whole area, where not cleared for cocoa or other crops, is densely forested, except for a narrow strip of scrub, 5 to 60 miles wide, near the coast.

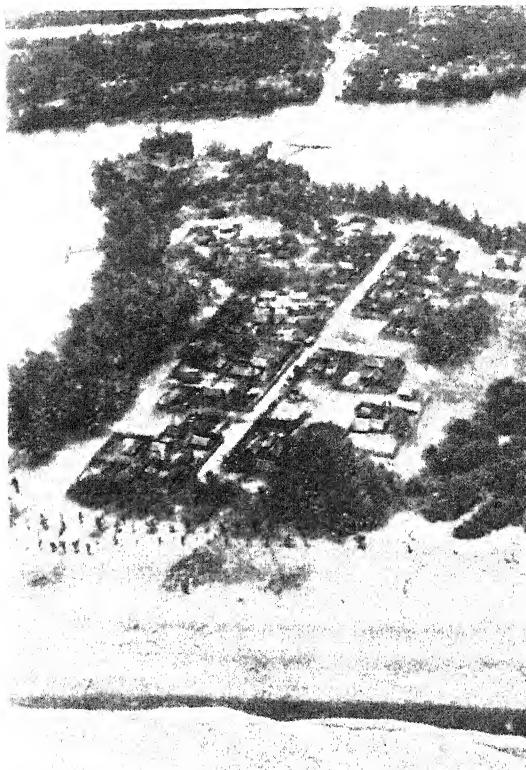
North of the forest belt the Ivory Coast is in no way dissimilar from the rest of the West African plateau. Its rolling lateritic plains are broken by lines of hills and isolated massifs, such as the Komonos hills and the tors near Bondoukou, while other familiar features



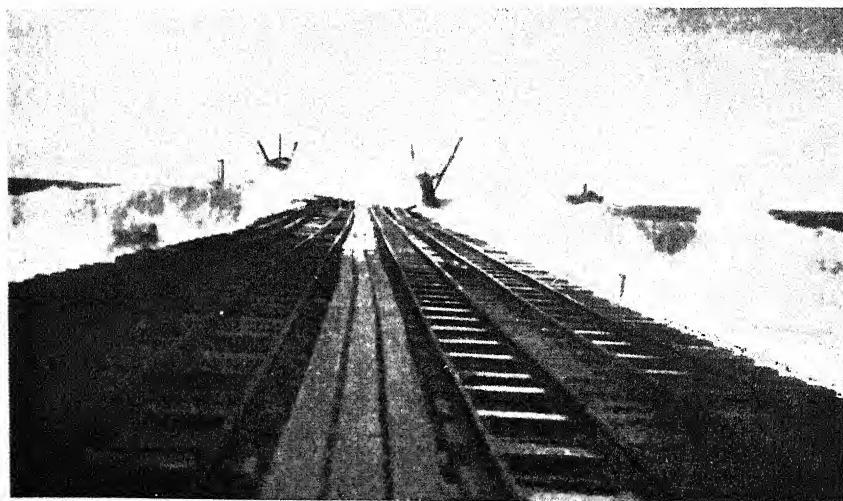
26. *Flooded savanna*



27. *The coast near Cape Three Points*



28. *Lagoons on the Ivory Coast*



29. *Surf at Grand Bassam*

recur—scarps formed by out-cropping strata, gallery forests, rivers changing from raging torrents to dwindling pools, and wide depressions filled with swamps after the rains.

The northern divide, as mentioned above, is very indefinite for the most part, and slopes southwards from it are very gradual. Along it rather higher ground is found east of Odienné, south of Sikasso, and

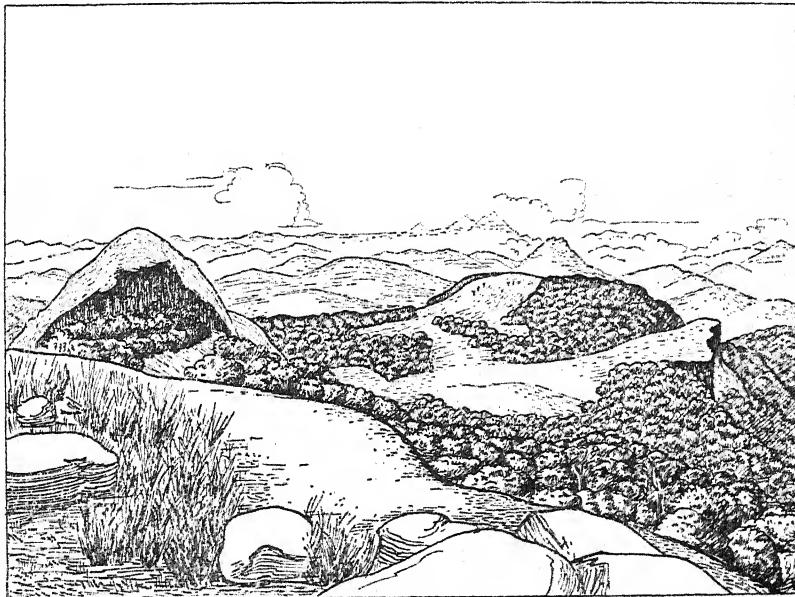


FIG. 18. *The Man Mountains*

east of Mopti. The head-waters of the Sassandra rise in the first of these, those of the Comoé on the southern slopes of the second, and the Bandama and Nzi rivers on the low col between them. The Sikasso plateau is bounded on its southern edge by a cliff-like scarp several hundred feet high. This scarp can be traced north-eastwards as far as the Hombori mountains, and is most prominent where, to the north of the Volta basin, it marks the south-eastern edge of the Bandiagara highlands (Fig. 19). North-west of Bobo Dioulasso the scarp, largely eaten away by the head-waters of the Black Volta, remains as a series of isolated hills.

The Volta Basin

With its tributaries, the Volta is second in West Africa only to the

Niger, and it drains an area of approximately 149,000 square miles, or about two-thirds of the size of France. In the south the basin

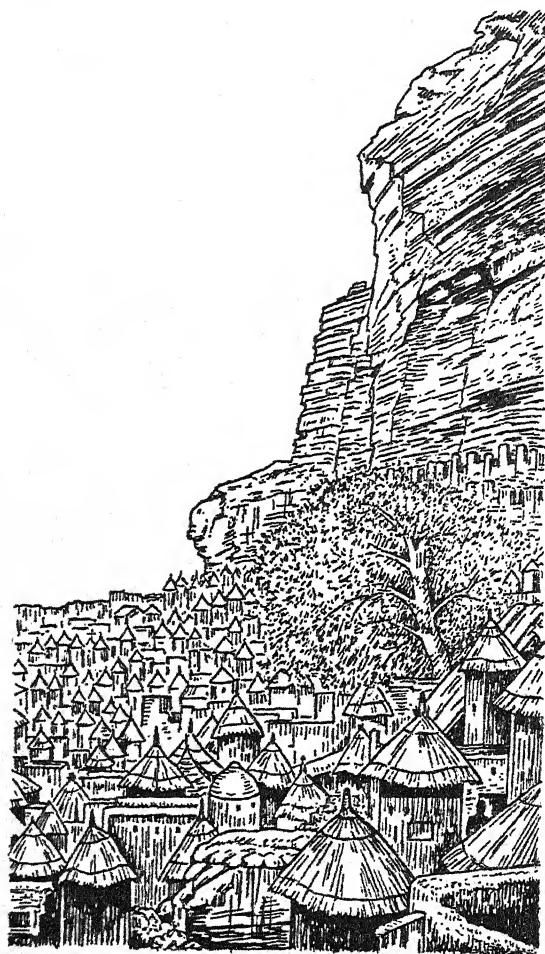


FIG. 19. *The Bandiagara Scarp*

narrows to a score of miles between the Ashanti hills and the Togo mountains. The valley widens north of latitude 7° , and here the Volta flows on the eastern margin of its forested plains. The slopes up to the Togo highlands are steep, whilst the western side of the valley rises more gradually to the northern scarp of the Ashanti hills. North of latitude 9° the Black Volta, the White Volta, and the Oti

follow courses that are roughly parallel from north to south. Thus their direction is similar to that of the Ivory Coast rivers in the same latitude, as also are their floods and the undulating plains between them. In the north-east of the Gold Coast, just south of the confluence of the Red and White Voltas, the Gambaga plateau forms a tract of open country bounded on the north by a bold scarp (Fig. 22, section 6).

Most streams in the former territory of upper Volta, to the north of the Gold Coast, are tributaries of the Voltas, but many small seasonal streams disappear after a few miles. Lake Bama, 70 miles north of Ouagadougou, is one of the rare permanent lakes in this part of West Africa. Farther west the head-waters of the Black Volta flow, like the Niger, towards the Sahara, and, like that river, now turn to the gulf of Guinea. A northern tributary, the Sourou, whose confluence is just below Koury, probably represents the original course of the river, and to this day the flood on the upper Volta is so strong that for some months it reverses the function of the Sourou and the current runs up that river for more than a hundred miles. Marshes are everywhere persistent and floods frequent from August to November. The rainfall is, however, smaller than it is farther south, so that, although there are the familiar tors and scarps rising from the plains, the country is more open. It is, however, one of the most densely populated parts of the Ivory Coast. Much of the natural grassland and bush is cleared for crops, and there are several large native towns.

Togo and Dahomey

The French colony of Dahomey and the French mandate of Togo lie between the Gold Coast and Nigeria. The north of Dahomey, as part of the Niger basin, has been described already. Of the southern part, the east is flat and very similar to the Ivory Coast. No natural feature separates it from the plains of south-eastern Nigeria. On the west is an imposing mass of high ground, 300 miles long, in the south usually known as the Togo mountains and in the north as the Atakora highlands. These highlands (for 'mountains' is too strong a word) run from south-south-west to north-north-east through the region, with several peaks of over 2,000 feet and the highest, Mount Agou (Baumann Peak), rises to 3,366 feet (Fig. 22, section 16).

The shore between the mouths of the Volta and Niger is again low and smooth. The sandy beach is beaten by heavy surf, obstructed by a continuous bar, lined by coconut palms and bush, and backed by lagoons. Except behind Lome, these lagoons, with their connecting

creeks and swamps, form a continuous belt from Keta lagoon in the west to the Niger delta. Most of them lie just behind the coastal sandbank, with their longer axis from west to east, but Keta lagoon varies considerably in size, since it receives the overflow of the Volta flood, and Lake Ahémé, which lies some way up the Cuffo, is longer from north to south. The Cuffo has direct communication with the sea near Grand Popo, but the exit is variable and shallow. Lake Nokoué, into which the Ouémé flows, is sometimes connected with the sea at Cotonou, while a waterway running for 50 miles eastwards just inside and parallel to the coast gives Porto Novo, on the north shore of the lagoon, permanent access to the sea at Lagos.

A low plateau of lateritic clay, about 200 feet high and 20 miles across, lies inland from these lagoons in Togo and Dahomey. The poverty of its soil and the light rainfall account for the open nature of its vegetation, but much of its natural bush has been cleared for cultivation. In Togo undulating plains continue this plateau northwest for about 30 miles, and the rise from them to the Togo mountains is very abrupt. This highland mass consists of a central range of broken forested hills buttressed on either side by an intermittent chain of lower heights, parallel to it, and separated from it by high plains across which rivers flow in deep ravines. Heights of 1,500 and 2,000 feet are common in the central range, but the flanking hills, though lower, are almost more imposing by reason of their bold relief and the abrupt drop on their outer edge. These highlands, widest between latitudes 7° and 8° , narrow northwards as the three ranges converge, and then fall slightly to the broken plateaux round Sokode. Here the Kara and other left-bank tributaries of the Oti have cut back into the high ground, lowering it and dissecting it into isolated blocks, which average 1,500 feet in height. The whole area is often referred to as the Kara gap region. Northwards the high ground is continued in the Atakora highlands, whose scarped plateaux have been mentioned above. They are drained partly to the Niger by the Mekrou and partly to the Volta by the Pendjari, the main tributary of the Oti river. After flowing north-east in its upper course for a hundred miles parallel to the Mekrou, the Pendjari doubles back south-west and, now as the Oti, winds southwards from the swampy plains of Gourma between the Atakora highlands and the Gambaga plateau. Its valley and those of its tributaries are widely flooded after the rains, and communications are often cut completely for several weeks.

In the east of Dahomey the coastal plateau falls northwards to a

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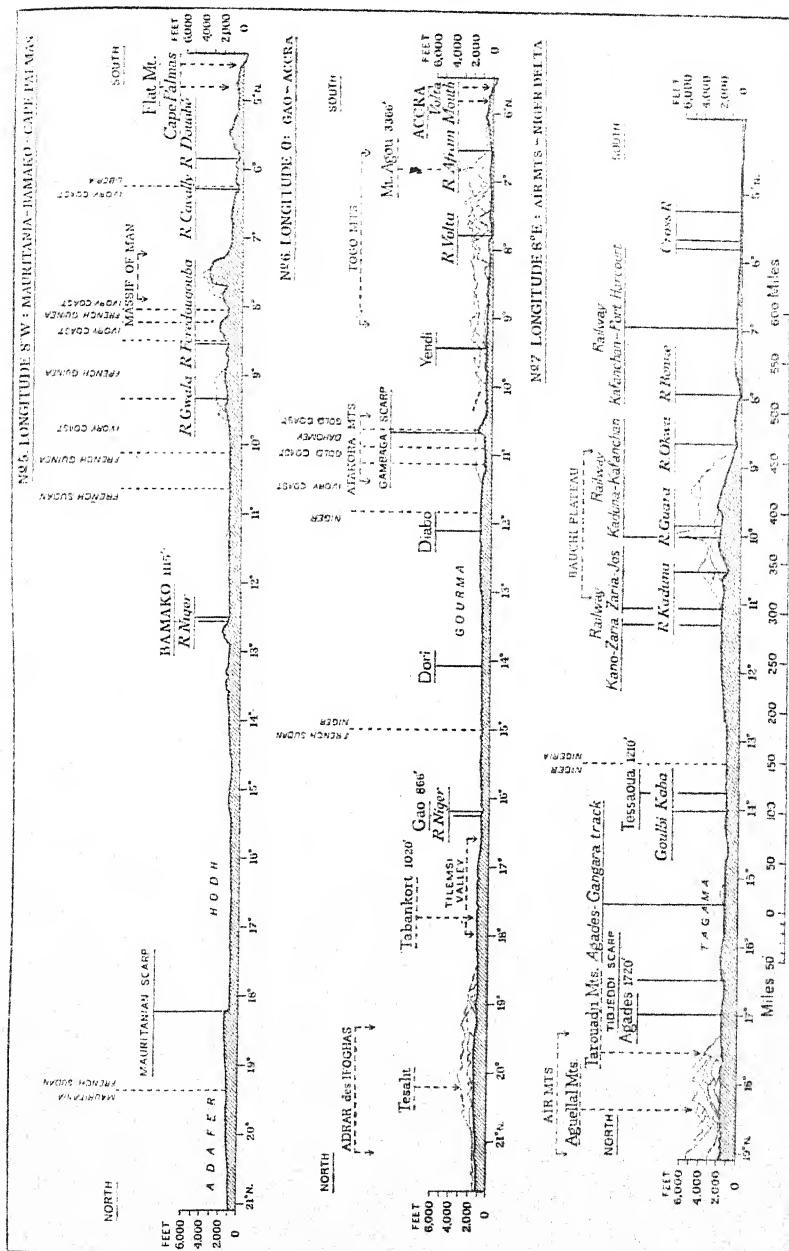


FIG. 22. Sections along the Meridians 8° W., 0°, and 8° E.

depression, in the centre of which lies the Lama marsh. This low ground, between 100 and 150 feet above sea-level, is 10 miles from north to south and 60 miles wide. Economically it is a most important feature, for, though fertile and heavily cultivated, floods are so widespread after the rains as to cut off the south-east of Dahomey almost completely from the rest of the colony. From the Lama depression and the marshes to its east round Lagos, plains, with open forest, rise gradually northwards by a series of shallow undulations from which massifs rise here and there. One such feature is the Delcessé mountains, whose summit, 1,558 feet above sea-level, is 800 feet above the surrounding plains. Northwards the forests give place to savanna with gallery forests. The divide between the Niger tributaries and the coastal rivers is about 1,600 feet high and, in Dahomey, lies almost exactly along latitude 10°. Rather higher ground occurs south of Nikki along the Nigerian border and runs south-eastwards past Ilorin, forcing the Niger to swing east before entering the sea, in much the same way as the Ashanti hills divert the Volta.

DEFINITIONS OF SOME DESERT TERMS

Adrar	plateau or highland.
Aftout	depression, in Mauritania.
Aguelt (see also Oglia)	well.
Ahaouak	see Azaoua.
Aïn (<i>pl.</i> Aïoun)	spring or source of water.
Aracher	see Ir'achar.
Arazar, Arazer	see Ir'achar.
Areg	see Erg.
Azaoua, Azaouad, Azaouak, Ahaouak	stretch of desert country.
Beh'ar	wide valley.
Bir (<i>pl.</i> Biar)	well.
Dahar	scarp or cliff.
Dalol	wide valley, in Niger.
Djebel	mountain.
Erg (<i>pl.</i> Areg)	large area of sand-dunes.
Goulbi	wide valley or temporary lake in same.
Gound	local name for 'aftout' (q.v.).
Gour	isolated flat-topped hill (mesa).
Hammada, Hamada	a boulder-strewn desert plateau.
Hassi (<i>pl.</i> Hassian, Houasi)	shallow well.
In (Tin)	well.

Ir'achar, Iracher, Irahari (Ir'ahar),	ouadi, in Niger.
Irazar (Ir'azar), Aracher, Arazar	
(Ar'azar), Arazer (Ar'azer)	
Kori	ouadi, in Aïr.
Kreb	scarp or cliff.
Ksar (<i>pl.</i> Ksour)	fortified village.
Natron lake	alkaline lake rich in soda.
Ogla, Oglat, Oguilet	well or group of wells.
Ouadi (Oued in Morocco)	dry watercourse with seasonal flow.
Reg	horizontal plain, completely bare, with gravelly surface.
Sbar	coastal dune, in Mauritania.
Sebkra, Sebkha	depression containing marsh after rain, often saline.
Taieurt	local name for 'aftout.'
Tanezrouft	completely sterile desert.
Tasili, Tassili	bare plateau, similar to hammada.
Ténéré	absolute desert.
Tin (In)	well.
Tiniri	plain without ravine or cliff.

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(Fig. 23)

General Outline

The relief of French West Africa, and of the territories which border the gulf of Guinea, is defined first by geological structure, secondly by the nature of the rocks exposed. It seems likely that the structure was already determined in broad outline before Mesozoic sedimentation began, and that it resulted from late and post-Palaeozoic epeirogenic movements. Mesozoic to Recent movements, following the same plan, have served to accentuate it.

A general analysis shows the following framework:

In southern Mauritania Archaean and pre-Cambrian rocks are exposed between the wide coastal belt and the western Saharan plains: the latter mark the vast Taoudenni-Araouane syncline of Palaeozoic sediments which may be traced to Tanezrouft. East of Tanezrouft the Archaean and pre-Cambrian rocks reappear in the complex dome of Adrar des Ifoghas and Ahaggar.

The Palaeozoic beds of the western Sahara may be traced southward across the upper Niger, rising on the flanks of the ancient

rocks which form the Guinea watershed, an enormous anticlinal region running from west to east, from Sierra Leone to Nigeria.

Between the northern prolongation of the Guinea watershed and Adrar des Ifoghas the middle Niger flows in a lowland into which transgressive Cretaceous and Eocene seas made their way from the gulf of Guinea.

East of Adrar des Ifoghas lies the massif of Air, an outlying part of the Ahaggar dome, also consisting of pre-Palaeozoic rocks, crowned by Recent lavas. Farther east, beyond a lowland, rises the Archaean-pre-Cambrian massif of Tibesti, with a girdle of Palaeozoic sediments and surmounted by Recent volcanoes and lavas. South of these broadly anticlinal regions lies the great basin of Chad, in which transgressive Cretaceous beds are exposed, flanked on the south by the western end of the gulf of Guinea-Abyssinia ridge, an ancient feature composed of Archaean and pre-Cambrian rocks which is separated from the highlands of Northern Nigeria by the Benue river.

A geological section along the 20th parallel would therefore reveal from west to east the Mauritanian uplands (anticlinal in general plan), the Taoudenni-Araouane syncline, the Adrar des Ifoghas-Ahaggar-Air domes (broadly anticlinal), the Chad depression, and the Tibesti dome. A section along the 10th parallel would follow the crest of the Archaean and pre-Cambrian highlands from the Atlantic to the Cameroons with scarcely a break. It will be appreciated, however, that these statements constitute broad generalizations designed to illustrate a simple plan subject to much modification in detail.

The plan set out above provides the key to the geological history of West Africa. Highly metamorphosed Archaean rocks are covered by less altered pre-Cambrian sediments: the denuded surfaces of one or other of these groups provided a level platform on which a Palaeozoic sea, transgressing into the heart of the continent, laid down its limestones, shales, and sandstones. Broad elevation and prolonged denudation followed the first or Palaeozoic transgressive stages, but the sea entered the continental interior in the Chad, Benue, and lower and middle Niger areas in Cretaceous times. It is likely, in fact, that this southern sea was in direct contact with the shallow sea which then lay over much of the French Sahara, Libya, and Egypt by way of Tanezrouft and perhaps by a gap on the west of Tibesti.

An Eocene transgression followed the Cretaceous invasion, but it was limited: it occupied a part of the middle and lower Niger basin, the lower Benue, and extended to the south-western part of the Chad

basin, but its extension therein is not fully known. At least in Nigeria movements and much denudation took place between the Cretaceous and Eocene transgressive phases.

With the withdrawal of the Tertiary sea, probably during the Eocene, another continental stage was established which has continued until the present time. Denudation of uplands and filling of hollows have continued without interruption: some movement has accentuated relief from time to time, and volcanic activity has been considerable. Changes of climate have been marked and great lakes, such as those which evidently lay along the general course of the Niger, have contracted or disappeared. Such changes are nowhere more noticeable than in the northern part of the Chad basin: in the first place it will be observed that the surface of this basin is occupied almost entirely by recent deposits, and that older strata are rarely exposed; secondly it must be noted that the recent deposits consist of extensive lake-beds with abundant fauna, covered by wind-blown sand. These two observations, together with much other evidence, suggest that not only has the lake shrunk to small proportions but that deposition has kept pace with depression which has continued in Recent times.

Changes in the coasts have been few. There is an unusually wide coastal plain in southern Mauritania and Senegal and the deposits are uniform: exposures are few, and sand-dunes burden much of the surface. It seems likely that the deposits represent uninterrupted Tertiary to Recent deposition.

From Portuguese Guinea to Dahomey fringes of Tertiary to Recent sediments indicate that the coast has changed only locally; from Dahomey to the Calabar coast the successive and undoubtedly thick deposits of the Niger delta region serve to show that only small changes have taken place, probably since Eocene times.

Geological History

The general outline of the sequence of geological events has been given above. The various rock groups and systems will now be considered in stratigraphical order.

Archaean, Pre-Cambrian

Over much of the outcrop of the ancient rocks two types can be recognized, one so highly metamorphosed that the original nature of the rock is not obvious to superficial inspection; the other, by comparison, only slightly metamorphosed.

The first includes numerous types of gneiss, some of them altered igneous rocks (*orthogneisses*), others recognizable as metamorphosed sediments (*paragneisses*, &c.): they probably represent a complex series of sediments invaded by deep-seated intrusions, and they have been subjected to one or more phases of dynamic metamorphism. This so-called fundamental complex everywhere forms the essential continental structure, and upon its denuded surface later sediments have been laid down throughout geological history. The complex is usually regarded as Archaean, and in West Africa no subsequent period of earth movements has produced comparable rocks. The fold-lines in the complex run NNE. to SSW.

The less metamorphosed group of rocks consist primarily of sediments, but they include igneous rocks some of which are unaltered. The igneous rocks may include intrusions which are immeasurably younger than the sedimentary series, but their pre-Cambrian association is reasonably certain when they are found exposed and worn down in the common denuded, peneplaned surface, upon which rest Palaeozoic sediments.

In many places the sediments are seen to rest discordantly on the Archaean complex, and they are classified here as pre-Cambrian. Continental geologists frequently refer to them as Proterozoic, or as Algonkian, a term used for similarly situated sediments in North America: for the purposes of this chapter pre-Cambrian, Proterozoic, and Algonkian will be regarded as synonymous.

The pre-Cambrian sediments are exceptionally well represented between southern Mauritania and Dahomey, and are sufficiently differentiated to be mapped separately. The following groups are distinguished: (1) conglomerates, felspathic schists, and slates; (2) mica-schists and slates; (3) breccias and quartzites; (4) quartzites. (1) and (2) are considered to be Algonkian and are transversed by igneous rocks, which are metamorphosed to crystalline schists and often survive on the surface when the country rock has decomposed. The older rocks (1) are exposed in the Atakora highlands (Buem formation). The two rock-groups are comparable with those known as Birremian in the Gold Coast and contain gold. The breccias and quartzites (3) are exposed especially in the Gold Coast, where they are called the Tarkwaian, and they are probably more than 6,000 feet thick. The quartzites (4), the Akwapianian or Atakora, also occur in the Gold Coast, in Senegal, and in the folded Atakora highlands from Accra to the Niger below Niamey: they contain silicified limestone and subordinate mica-schists. They are known to be pre-Devonian,

and they have affinities with the Saharan Palaeozoic sandstones, but they seem to be older than these and they have suffered severe folding and dynamic metamorphism. They have been recorded as Cambrian, but this view is unconfirmed.

The general folding of the four series, which are on the whole conformable, is NNE.-SSW., and it is undoubtedly pre-Silurian: it conforms, therefore, to the so-called Saharide trend. In the Gold Coast there was folding between the periods of accumulation. The Atakora series, and the highlands of that name, present a geological problem which is by no means solved.

Slightly metamorphosed sediments, correctly considered to be pre-Cambrian but lacking the clear-cut subdivision outlined above, outcrop in the mountains of the central Sahara, notably in the northern and eastern part of Adrar des Ifoghas and in eastern Air. They may be followed at intervals eastward into the Tibesti massif, where they are well exposed and capable of some subdivision.

Palaeozoic Systems

Palaeozoic sediments are essentially the products of a transgressive sea: they comprise dominant and widespread sandstones which are commonly siliceous, shales, limestone, and dolomite. Nevertheless it would be wrong to regard all the sandstones as marine, because some of them are probably no more than consolidated sand-dunes of continental origin.

In the Sahara and Mauritania there is evidence that the sea spread over the continent stage by stage from west to east: Cambrian sediments are claimed to occur in some parts of the north-west, but there is no evidence provided by fossils that the Cambrian sea advanced into the central Sahara, whereas fossiliferous Silurian, Devonian, and Carboniferous beds are now proved east of the Ahaggar: Ordovician sediments are known to occur in the interior, but fossils which would provide proof of age are generally lacking. The beds are well displayed in the huge Taoudenni-Araouane syncline (Fig. 23). The basal series consists of lower dolomites, limestone and sandstone, middle shales and upper sandstones; fossil evidence of age is unsatisfactory in this region, and Cambrian should be regarded as a term of convenience during the present exploratory stage in the Sahara.

The basal series is overlain by a threefold arrangement of beds, consisting of lower sandstones, middle shales, and upper sandstones and limestones. The lower sandstones, prolonging those of Mauritania,

contain rare fossils attributed to the Ordovician, but over wide areas, especially towards the east, they are unfossiliferous, and might well be regarded as an essential part of the overlying shales. The shales indicate a far-reaching open sea, spread over much of the interior of the Sahara, into which rivers poured mud instead of sand: fossils (Gothlandian graptolites) show the beds to be Silurian.

The overlying Devonian beds are generally conformable on the Silurian strata, except perhaps in the south-west Sahara, where elevation may have caused a gap in the series. The Devonian succession is capable of subdivision, owing to the presence of marine fossils which are typical of the system in Europe. Lower Carboniferous (Dinantian) sandstones and limestones follow conformably; they are marine and fossiliferous. Finally the sea withdrew steadily: lagoons and continental surfaces took its place in Upper Carboniferous (Westphalian) times, and the beds then laid down contain remains of contemporary plants. The continental surface then established remained dry land until Mesozoic times, and, in some parts of the Sahara and French Sudan, it has probably remained land till the present time.

In Senegal, French Sudan, and in the Gold Coast sandstones overlie a group of beds consisting of quartzites, banded jasper, limestone and dolomite, shale, sandstone, and conglomerate (Oti formation of Togo). This lower varied series lies on the pre-Cambrian rocks. Both lower and upper series are unfossiliferous, and there is no precise evidence of age, but, as the rocks are undoubtedly pre-Cretaceous, they must be placed in the Palaeozoic. They are interbedded with volcanic rocks (diabases) in Senegal and French Guinea. It should be added that fossiliferous Palaeozoic sediments occur on the northern and eastern side of the Chad basin, and on the southern side of the Ahaggar between Adrar des Ifoghas and Aïr, where they form plateaux and escarpments known as *tasili*. These unquestionably belong to the facies of Mauritania and the central Sahara (including the Fezzan and northern Tibesti), but there is no physical barrier between them and the Palaeozoic series of the French Sudan and the Gold Coast, nor is there sufficient reason to suppose the Atakora or other mountains formed such a barrier in Palaeozoic times.

The difference between the northern differentiated series and the southern undifferentiated groups lies in certain lithological peculiarities and in the lack of fossil evidence for correlation, but they may reasonably be regarded as associated.

Mesozoic Systems

Continental stages and subsequent marine transgression may be identified. In Morocco and the north-western Algerian Sahara the end of the Palaeozoic was marked by considerable mountain-building movements. In the rest of the Sahara and in the French Sudan epeirogenic movements, i.e. broad undulations, uplift, and depression, accompanied by some igneous activity, took the place of folding. Prolonged sub-aerial denudation followed. It is significant that neither Permian nor Triassic beds are reported in French West Africa or adjacent territories.

Post-Carboniferous continental accumulations seem either to have been insignificant or to have been swept away subsequently. The oldest identified Mesozoic beds are continental sandstones, conglomerates, and variegated clays which rest on the denuded surfaces of Palaeozoic and older rocks of the Taoudenni-Araouane syncline, of Adrar des Ifoghas and of Air. They contain silicified wood and occasionally remains of dinosaurs. Their age is difficult to assess, and probably differs from place to place: they are commonly referred to the Lower Cretaceous, but they may also include accumulations of Jurassic age.

The continental beds which represent the long period from the Upper Carboniferous to the Lower Cretaceous are frequently termed the *continental intercalaire* by French geologists: sometimes it is possible to detect older and younger divisions.

The history of Nigeria is a closed book throughout the Palaeozoic and the greater part of the Mesozoic: these territories then probably formed part of an extensive land-mass which was subjected to continuous denudation. The adjoining Chad basin affords little additional information: inliers between the northern end of the lake and Bilma reveal Upper Cretaceous marine beds which rest on pre-Cambrian rocks.

At the northern margin of the basin, a little outside the boundary of French West Africa, the Nubian Series outcrop along the frontiers of French Equatorial Africa and Libya: these beds are of continental origin, in part at least analogous to those of the south-western Sahara.

Marine transgression took place over much of West Africa during the Upper Cretaceous: it is commonly called the Cenomanian transgression, but the beds probably represent here and there the greater part of the Upper Cretaceous (including the Maestrichtian). From a purely geographical point of view there are two regions, the Saharan,

covered by a shallow sea which advanced probably from the north, and the Nigerian, invaded by a long arm of sea up the present Benue and Gongola valleys to the foothills of Aïr and Adrar des Ifoghas. It is evident, however, that the southern sea spread far to the north and north-east, where it may have been joined to the northern sea by a narrow strait between Tibesti and the Fezzan, and to the north-west, where it joined the northern sea between Araouane, Taoudenni, Adrar des Ifoghas, and the western Ahaggar (Fig. 13). The deposits, which are fossiliferous, consist for the greater part of sandstones and variegated clays in the lower part (marking the initial stages of salt-water lagoons and shallow seas), and of siliceous and chalky limestones above. The limestones, which to-day form extensive plateaux and scarps, are uniform over great distances: nowhere do they indicate any considerable depth of water.

The marine invasion of the interior of the continent evidently continued to the dawn of Tertiary times, and may indeed have lingered into the early part of the Eocene. In Nigeria the shallowing seas gave place to lakes in which sandstones and the coal seams of Enugu were formed. Regression took place in the Sahara as a whole and in West Africa, accompanied probably by elevation and differential movements. In Nigeria, uplift, appreciable folding, fracture, and deep denudation were particularly marked, so that Eocene marine beds along the Benue and lower Niger rest directly on the most ancient rocks. There was some volcanic activity and intrusion in widely separated districts of West Africa and the south-western Sahara.

Tertiary Systems

In North Africa mountain-building movements marked the end of the Mesozoic era and heralded the Tertiary: the Atlas mountain system was rough-hewn. The repercussions over the Saharan platform were widespread, but once more were epeirogenic: undulations, basins, and uplands were created, and the sea was driven out. In Nigeria also, as explained above, movement was extensive and severe, and the Eocene deposits are unconformable upon older rocks: in eastern Nigeria and part of the Chad basin the Kerri-Kerri group consists of sandstones and clays without recognizable fossils.

In the plains of the middle Niger and Dallol Bosso, however, Eocene beds are extensive: they include clayey sand, marl, limestone, gypsum-bearing marl, and ferruginous sandstone (Niger sandstone). These seem to indicate the presence of lagoons and mud-flats, and perhaps represent a passage from marine to continental conditions.

They may be traced approximately to Timbuktu, and probably extend farther north and west beneath superficial clay and sand. They may therefore be allied to the Koro beds which are found widely around Koro, between Timbuktu and the Volta river, although they are usually hidden beneath superficial deposits and are best known from well-sections. The precise age of these beds is unknown: they consist of siliceous and oolitic limestone, shale and shaly sandstone, thus resembling the Niger sandstone.

It is evident from the above that the Tertiary marine phase in the interior of West Africa was indifferently developed, and that the sea was ultimately excluded: it seems unlikely that it outlasted the Eocene. A new continental phase thus became universal, and it has lasted till the present day: it is believed by some authors that the sea re-entered the Chad area of Nigeria at the end of the Tertiary (giving rise to the Chad group), and that re-emergence was accompanied by the establishment of the present lake system.

It is clear, moreover, that the Niger, especially in its middle reaches, was an extensive region of freshwater lakes in late-Tertiary and Pleistocene times. The present flow of the river, extensive accumulation of alluvium, and drift of sand prevent the maintenance of such wide flooding. Isolated lakes and great areas of marsh and swamp mark the site of the formerly flooded region.

The west coast of Africa and the northern shores of the gulf of Guinea were evidently much the same in Tertiary times as they are to-day. They are fringed by sand, sandstone, shale, marl (some of it phosphatic), and limestone which in Senegal and Gambia constitute the Ferruginous Sandstone series. This series, still imperfectly known, is no doubt Tertiary in part, some of it possibly Cretaceous, and it is covered by superficial deposits suffering severe chemical weathering. The Tertiary beds of the coastal zone of Nigeria vary widely in age and origin. The oldest are known as the Carbonaceous or Pebby Sandstone group, and, separated from these beds by a prominent unconformity, are highly fossiliferous marine and estuarine beds (Bende-Ameki group), the age of which is not yet fully determined. The second group is followed by a third, comprising the economically important lignites of the lower Niger and eastern Nigeria. To what extent these groups are contemporary with those of northern Nigeria which extend into French West Africa is not yet known.

Late Tertiary or possibly Quaternary depression of southern and eastern Nigeria led to the accumulation of marshes of soft pebbly

sands and gritty clays (the Benin sands) in the swamps and lakes fringing the old coast. They lie unconformably on the eroded surfaces of the lignite and older groups. The sands and clays of the Chad group, which occupy much of Bornu and Kano, may belong to the same period as the Benin sands. By far the greatest recent accumulation in the coastal area is the great delta of the Niger, a vast pile of alluvium of great thickness which has been prospected for oil.

Although the Tertiary deposits are fragmentary, ill assorted, and, on the whole, little known, it must not be assumed that they alone represent the later stages in the development of West Africa.

Vertical movements took place which, continuing into the Quaternary, gave rise to the present relief: profound changes of the surface took place, of which some examples may be given. The basins of the Niger, Benue, and Chad suffered depression and are now deeply buried in varied continental accumulations (as noted above), but the postulated great Quaternary lake or arm of the sea in the central Sahara and French Sudan (including the Niger) seems improbable. The Chad basin is heavily burdened with Quaternary superficial deposits and alluvium, but the extent of Quaternary depression is still in question. The massifs of the Ahaggar (including, probably, Adrar des Ifoghas and Air) and of Tibesti were elevated, and owe their intense denudation to that fact. Old fault-lines were re-suscitated and differential movement took place.

Volcanic activity was intense, volcanoes and sheets of lava being built up: they dominate the landscape of Air, as they do in the Ahaggar and Tibesti, outside the frontier of French West Africa. There are volcanic outcrops in northern Chad and in eastern Nigeria. Although many of the volcanic regions have suffered much denudation, there is reason to believe that the volcanic phase continued throughout much of Quaternary time. The lavas are of varied chemical composition, including rhyolites, trachytes, phonolites, and basalts and their equivalent intrusive types.

Quaternary and Recent

The Quaternary is scarcely separable from later Tertiary history, and as such has been included above. Apart from depositional, structural, and volcanic phases already noted, the outstanding changes have been associated with weathering and denudation. In the deserts, including coastal Mauritania and Senegal, ceaseless destruction of all rocks, including ubiquitous sands and sandstones, has provided an inexhaustible supply of sand, which has been distributed primarily

by wind. In the heavy rainfall belts chemical changes have produced sheets of laterite and lateritic products, and have led to rotting of all but the most insoluble rocks. The question of laterite formation is discussed below. It should be noted, however, that past distribution of climatic belts has led firstly to the formation of sand-dune areas south of the present desert margin, and secondly to stabilization of the old dunes and reddening of their cementing materials by chemical processes. These changes in the climatic belts have led not only to old, now stabilized, dunes but to the formation of laterite in regions where it cannot form under present climatic conditions: in these areas now arid, it is being denuded.

Laterite

The word 'laterite' (Lat. *later*, a brick or tile) was first used in 1807 in description of certain red or reddish-yellow soils in southern India. Yet in no continent is laterite so widespread as in tropical Africa, where it forms the commonest product of weathering of all rocks other than siliceous sandstones and quartzites. A note on this weathering is therefore appropriate. Under normal conditions of rock disintegration in a humid, temperate climate, rock-forming minerals break down to give the hydrated aluminium silicates which form the constituents of common clays. Under tropical conditions, on the other hand, especially where there is a marked alternation of wet and dry seasons, rocks are leached not only of all their lime and magnesia, but also of almost all their silica, so that only the hydroxides of iron and aluminium are left. This residue constitutes laterite. Laterite therefore consists essentially of ferric hydroxides, with hydroxides of aluminium and a little manganese, titania, and some residual silica. Where the underlying rock is highly aluminous, aluminium hydroxides predominate in the product of weathering, and a special light-coloured variety of laterite known as bauxite is formed.

Throughout West Africa laterite is widely developed south of latitudes 14° to 16° N., notably on sandy shales in the northern exposures and on basic igneous rocks such as diabase in the wetter tropical regions where drainage is poor. It is generally lacking in hilly country, but may accumulate in hollows, much of it in districts of hilly or rolling topography being derived from deposits formed at higher levels. Even where it is no longer forming, as in parts of French Guinea, it may persist in a fossil state, capping terraces or

plateaux. Thicknesses of 15, 20, or even 30 feet of laterite may be observed in railway- or road-cuttings in Sierra Leone.

Laterite is infertile and where it appears as a hard crust it gives rise to almost desert conditions. Partly this lack of fertility is due to the combination of the phosphates, originally present in the parent rock, with the iron and aluminium hydrous oxides, thus assuming a form unassimilable for plant life. In the region of the tropical forests, however, and for some hundreds of miles inland, the laterite is loose, uncompacted, and, in general, forms a soil which is easy to work, although there are exceptional areas. The harder varieties have been used as a building stone in French Guinea and elsewhere, and the lateritic gravels are commonly employed as road surfacings. Some laterized gravels have been worked for diamonds in the Gold Coast. Certain of the more ferruginous laterites have long been worked as iron ore and smelted in native bloomeries; and within the last three decades there has been considerable European prospecting of the alumina-rich bauxitic modifications, which are known at several localities in western Guinea and which in the Gold Coast are now exploited as aluminium ore.

CHAPTER III

CLIMATE

Pressure is given in millibars, rainfall in inches, and temperature in degrees Fahrenheit.

SUMMER and winter are terms of small climatic significance in tropical lands. Days vary little in length and temperatures are relatively uniform. The all-important factor is the alternation of wet and dry seasons.

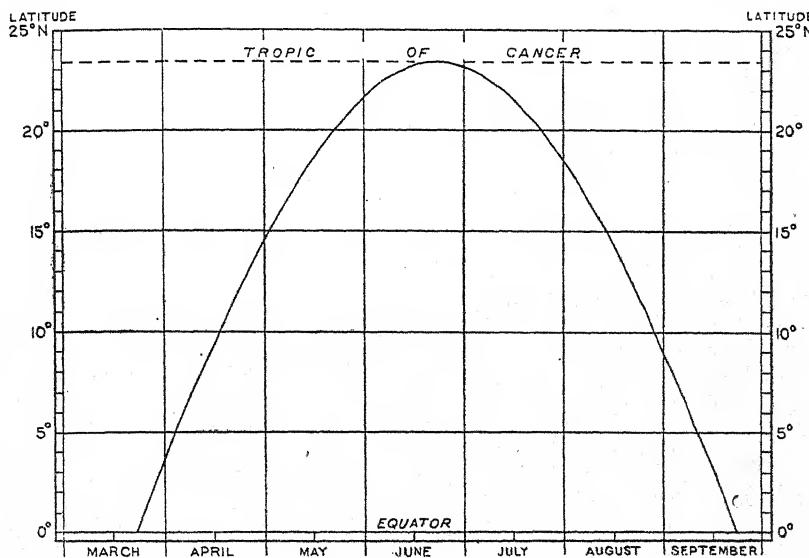


FIG. 24. *Apparent Declination of the Sun over French West Africa*

In West Africa rain comes mainly with south-west winds, while intensely dry heat and clouds of sand accompany north-east winds. These are the two main wind currents coming from areas of high pressure which lie on either side of equatorial low-pressure. The wet and dry seasons are due to the fact that the three pressure systems move northwards and southwards together, in tune with the apparent motion of the sun, and that wet wind and dry wind alternate

accordingly. This broad fact is, naturally, modified by minor, and often daily, changes of pressure within the areas themselves.

PRESSURE (Figs. 25 and 26)

The central of the three areas concerned is the equatorial low-pressure belt commonly known as the 'doldrums'. To north and south lie areas of high-pressure, from which winds blow to the doldrums. The southern high-pressure area is the only one of the

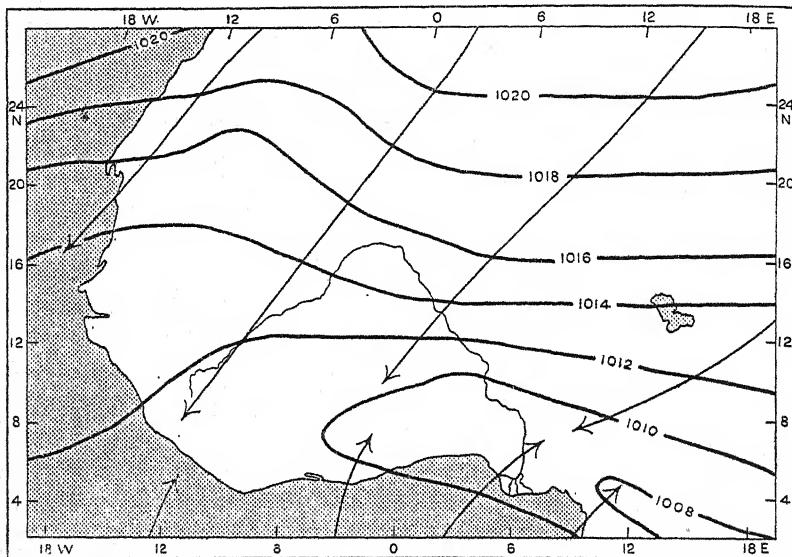


FIG. 25. January Isobars and Winds

three which never lies over West Africa, but it is, in some respects, the most important, for from it come those winds which bring rain.

In January (midwinter), with the sun overhead in the southern hemisphere, the three pressure systems are in their most southerly position. Over the Atlantic the northern high-pressure area extends from latitude 15° N. to 40° N. and across north Africa from latitude 25° N. to 35° N. The region of highest pressure lies between the Azores and Canary islands. Pressure decreases rapidly southwards to the equatorial low-pressure belt, which, at this season, lies along and just to the south of the Guinea coast, and is about 100 miles wide from north to south.

In summer the northern high-pressure area moves north, retreats westwards over the sea, and increases slightly in intensity, centring

at latitude 35° N., longitude 40° W., 600 miles west of the Azores. Concurrently the belt of calms moves north, widening as it goes, until it reaches 17° N. in July, when it expands into, and joins, the low-pressure system that has been developing with the great heat over the Sahara. From September to January the movement is reversed.

Annual pressure changes, as registered at any one station, are nevertheless slight. On the coast mean monthly pressures seldom vary by more than 6 mb., and inland the range rarely exceeds 8 mb.,

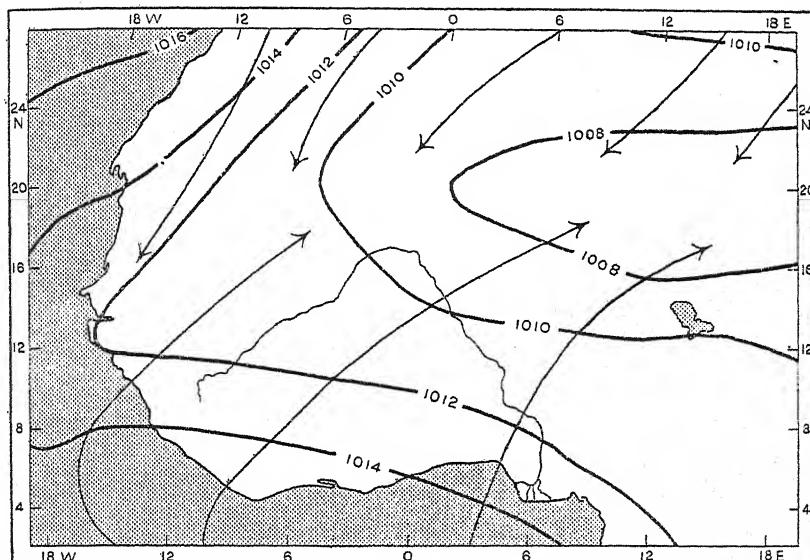


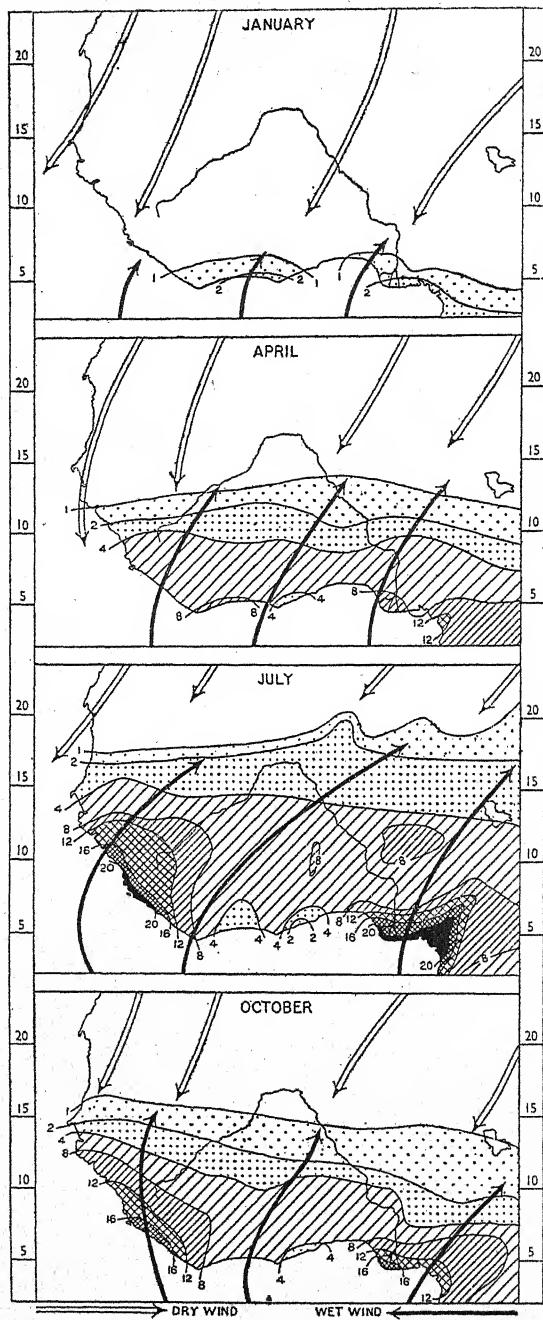
FIG. 26. *July Isobars and Winds*

even where variations are greatest. On the other hand, diurnal variations are greater throughout the year than in temperate latitudes, being of the order of 3 to 4 mb., and occasionally as great as 6 mb. in the dry season. Pressure maxima occur at about 10 a.m. and 10 p.m., and minima at 4 a.m. and 4 p.m. Storms may cause temporary variations of 3 or 4 mb.

WINDS

Seasonal Winds (Fig. 27)

In view of the fact that the low-pressure belt lies along the Guinea coast in January, the whole of West Africa, as far south as latitude 5° on the west coast, and latitude 7° inland, is swept by north-east winds blowing from the northern high-pressure belt. Over the west



Isohyets in inches

FIG. 27. Seasonal Shift of Surface Wind and Rain Belts

coast these winds are the 'trades', and are cool and fairly humid, since most of their passage has been over the sea. Inland the north-east winds, hot and excessively dry, blow from the Sahara and are known as the 'harmattan'. At any time of the year the latter may intervene in the trades, and may even reach the south coast for short periods from November to February. The velocity of both trades and harmattan is normally between 10 and 15 m.p.h., and both are felt only in the lower layers of the atmosphere. Their southern limit varies with the intensity of the northern high pressure that gives them birth.

The south-west winds begin as the south-east trades from the southern high-pressure belt, and are diverted from their original direction after crossing the equator. On the coast, south of latitude 6° , winds from this quarter are prevalent all the year, though in January they are feeble and frequently interrupted by the calms which are so marked a feature of the doldrums. As the low pressure moves north, these south-west winds—now usually known as the south-west monsoon—strengthen and gradually take the place of the retreating north-east winds, until by July they cover the country as far north as latitude 14° on the coast and 20° inland. From August onwards they retreat, until the January position is reached again. These south-west winds are only felt in the lower layers of the atmosphere, and their speed seldom exceeds 15 m.p.h., decreasing inland to about 5 m.p.h. on their northern edge.

Sea- and Land-breezes

Near the coast the seasonal winds may be replaced by sea- and land-breezes, especially during periods of calm. As the land heats up during the day, a sea-breeze rises, reaches a maximum between 3 and 5 p.m., and dies away after sunset. As the land cools a land-breeze rises after 10 p.m., although often not until just before dawn, and lasts until about 8 a.m. Except where land slopes steeply to the coast, the sea-breeze is usually the stronger.

The effect of these sea- and land-breezes varies. They may divert the normal wind, as in Mauritania, where the north-east trades are more often north-north-west by day and east-north-east at night; they may reverse it, as in Portuguese and French Guinea, where, in January, a westerly wind frequently replaces the usual north-east winds during the afternoon; or they may reinforce it, as along the Guinea coast, where the south-west monsoon is especially strong in the afternoon. They are, however, much influenced by local

topography, and vary considerably from place to place. Their speed is rarely in excess of 15 m.p.h., and their effect usually extends no more than 10 miles inland, and only from 1,000 to 2,000 feet upwards.

Tornadoes

The whole area is subject, at irregular intervals, to violent storms called tornadoes. They occur at the beginning and end of the wet season along the northern edge of the monsoon, where the air is in a state of instability between the north-east and south-west winds. They seldom number more than ten, even in the worst month.

Tornadoes may blow up at any time, although most commonly at night, with an average speed of 35 to 40 m.p.h., but always from an easterly direction, except on the coast of Senegambia, where they commonly move from south to north. Their approach is heralded by dark clouds and frequent lightning in the east. The prevalent westerly wind dies away immediately before their onset, pressure rises, and violent squalls break, often with incessant thunder and lightning. They are sometimes followed by heavy rain. Wind speed is usually from 40 to 50 m.p.h., and gusts up to 60 m.p.h. may be experienced. The wind subsides after about a quarter of an hour, but the rain, heavy at first and then lighter, may last for an hour or two. After the passage of a tornado temperatures will always be found to have fallen several degrees, and there is an appreciable interval before the westerly wind re-establishes itself. The area covered is relatively small (usually some 30 miles from north to south), but the track can be traced over great distances. For example, one tornado that started at Zinder, north of Kano, disappeared out to sea over Dakar. After the rains in the interior dry tornadoes are experienced, with violent dust storms and no rain.

Depths of Currents and Upper Winds

As has been indicated above, the north-east trades, the harmattan, and the south-west monsoon are all surface winds. An attempt has been made in Figs. 28 and 29 to show the heights at which these winds will be found, but it must be remembered that little accurate research has been carried out so far upon the vertical distribution of the air, though the facts are well enough known in general terms. Both the trades and the monsoon are wedge-shaped—the former thinning from north to south, and the latter from south to north—but the depth of each layer varies considerably from day to day and even from hour to hour. The upper surfaces of the trades and of the

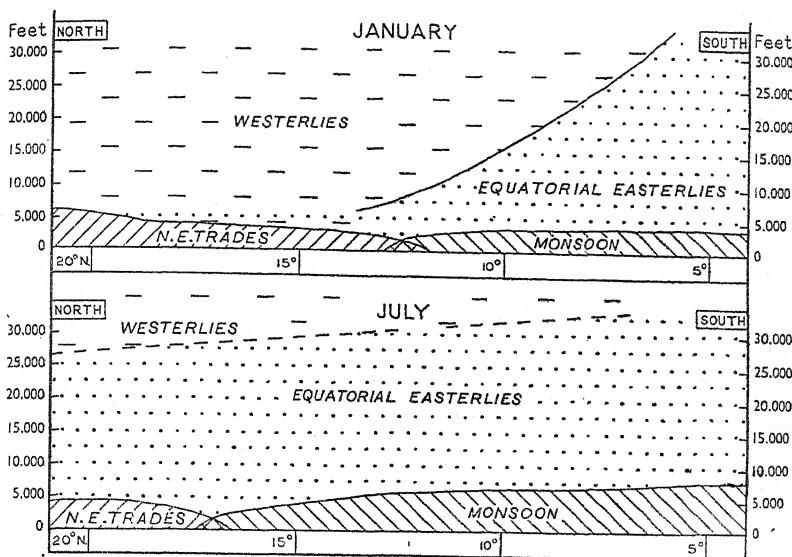


FIG. 28. Vertical Distribution of Wind: Longitude 16° W.

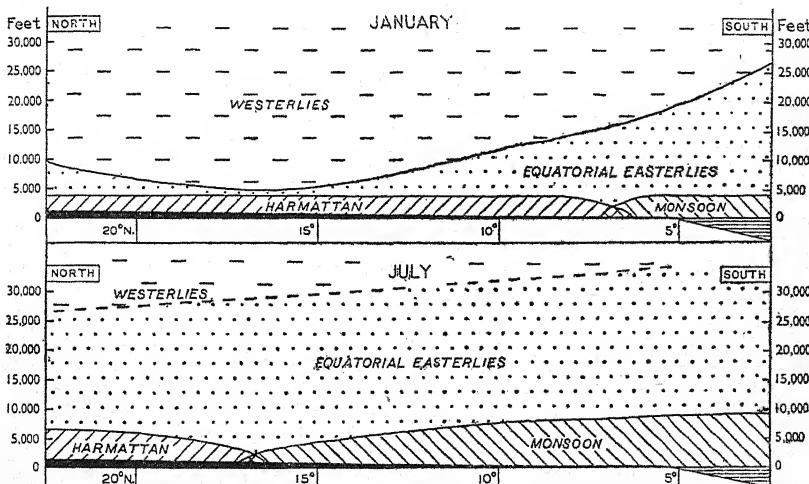


FIG. 29. Vertical Distribution of Wind: Longitude 0°

monsoon are fairly well defined at about 3,000 or 4,000 feet over the thinner end of the wedge, and 6,000 to 8,000 feet over the thicker end, but the height of the upper surface of the harmattan is more variable and less easily determined.

Above both these surface winds, and above the sea- and land-breezes, easterly or north-easterly winds are to be found at heights varying according to the season and time of day. Much confusion exists over their nomenclature, for by some they are called the equatorial easterlies and by others the harmattan. In many ways their characteristics are those of the harmattan, for they are dry and carry a dust haze, but the former name would seem to offer less confusion and is therefore used here. These easterly winds attain to very great heights, and are to be found filling the middle layers of the atmosphere over most of West Africa all the year. In January their top surface lies at an average height of 5,000 to 8,000 feet over the north of West Africa, and about 20,000 feet over the Guinea coast. In July they reach to great heights, certainly above 30,000 feet. Their velocity is normally about 10 to 15 m.p.h., but may occasionally be much greater.

Above the equatorial easterly drift is a westerly current, sometimes known as the counter-trade wind and extending to very great heights. Its speed is also about 10 to 15 m.p.h. Occasionally it is to be found superimposed directly on the trades.

RAINFALL, CLOUD-COVER, AND THUNDERSTORMS

Rainfall (Figs. 30, 31, and 32)

Broadly speaking, the length of the wet season and the quantity of rainfall are determined by the duration of the south-west winds. The equatorial low-pressure belt, however, also gives rise to heavy rain, being an area of ascending air.

South of latitude 7° West Africa has rain in every month, although two relatively dry intervals, December–March and July–August, separate the periods of heavier rainfall. North of latitude 7° the latter dry interval (July–August) gradually disappears, whilst the December to March interval lengthens, until, north of the line shown on Fig. 30, two well-defined seasons, one dry and one wet, become the rule.

As Fig. 32 and the following table show, rains start earlier and last for a longer time as latitude decreases, whilst the number of rain-days and the total rainfall increase.

CLIMATE

65

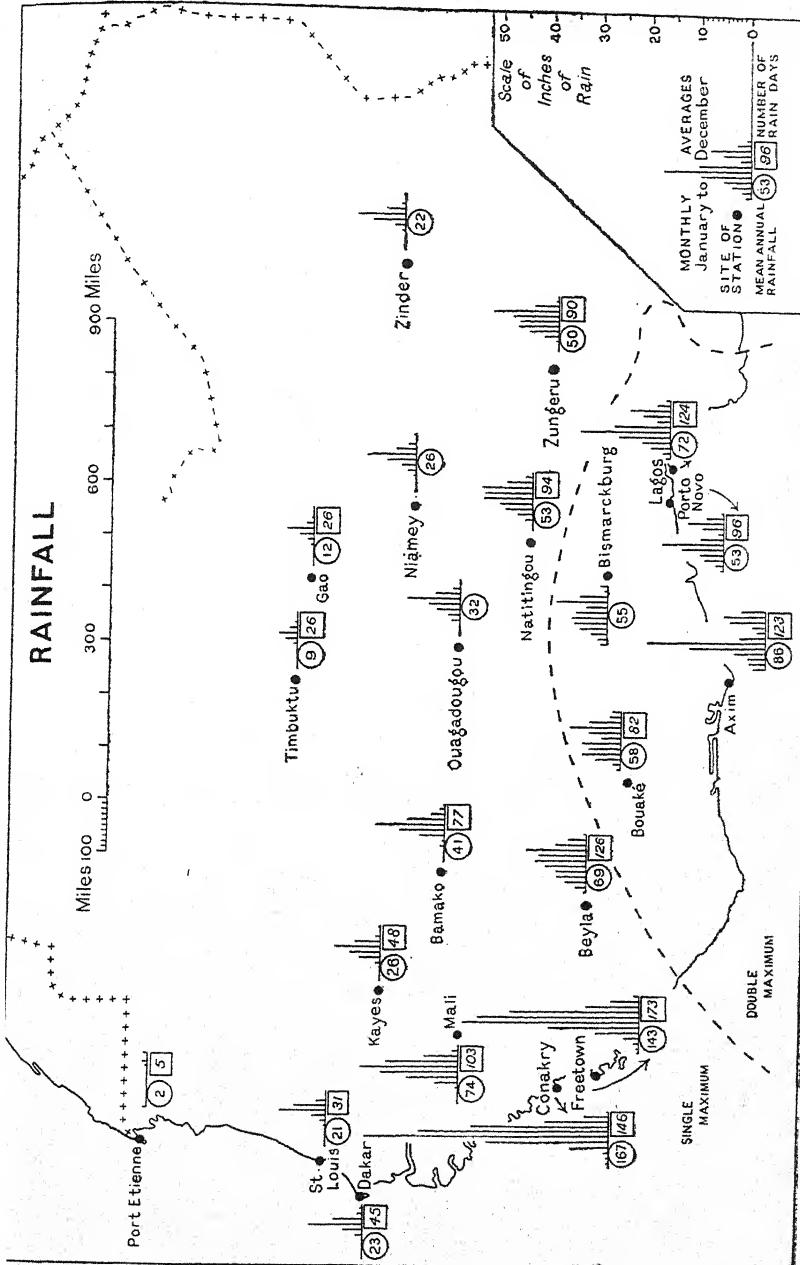
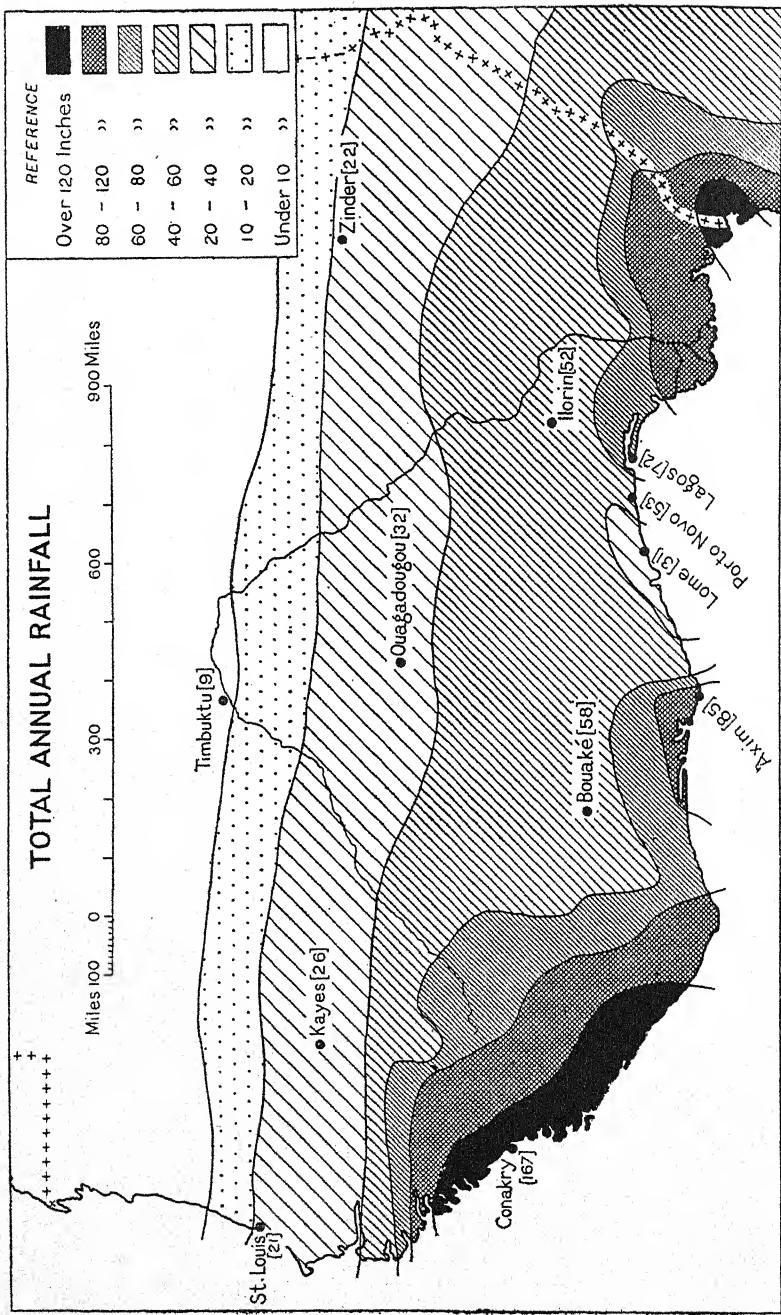


FIG. 30. Rainfall

FIG. 31. *Total Annual Rainfall*

	<i>Latitude</i>	<i>Start of rains</i>	<i>Duration in months</i>	<i>Rainfall in inches</i>	<i>Rain-days</i>
Timbuktu	16° 41' N.	July	3	9	26
St. Louis	16° 01' N.	July	3	21	31
Dakar	14° 40' N.	June	4	23	45
Bamako	12° 39' N.	June	5	41	77
Natitingou	10° 16' N.	April	7	53	94
Conakry	9° 31' N.	April	7	167	146

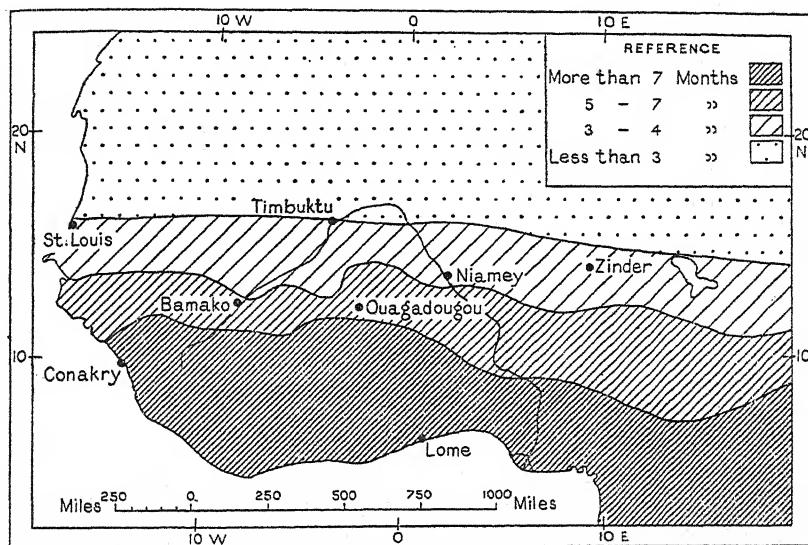


FIG. 32. Length of Wet Season

The heaviest falls occur from July to September, in which months amounts for any 24 hours may be considerable, causing widespread floods and extraordinary rises on the rivers. On the low-lying coastal plains and on the monotonous expanses of the interior plateau roads and landing-grounds become unusable unless concreted or macadamized, bridges are submerged, fords obliterated, and hundreds of square miles of low-lying country become impassable morass.

Nevertheless, in spite of large annual totals, the persistent rain of temperate latitudes is rare, except by night and, during the height of the wet season, on the south-west coast. Usually mornings are fine and most rain falls during the afternoon in heavy showers which last from a few minutes to several hours. Rain-days are frequently separated by long periods of fine sunny weather, especially inland.

Records show that rainfall is subject to considerable annual variations inland where variations of 50 per cent. are common, especially towards the north, but is more regular on the south and south-west coasts.

To these generalizations there are two important exceptions. First, the coast from Portuguese Guinea to Liberia and, to a less extent, the extreme west of the Gold Coast, lie across the path of the monsoon and attract a heavier rainfall (Fig. 31). Second, in contrast, there is but little rain along a narrow coastal belt eastwards from Cape Three Points to the Nigerian frontier. There are two reasons for this drier belt. In the first place the warm Guinea current, flowing east along the coast, is diverted by Cape Three Points so that colder water wells up close inshore, and, in the second, the coast itself runs parallel, and not perpendicular, to the monsoon.

Cloud-cover (Fig. 33)

Cloud-cover is greatest in the south of the area and increases everywhere in the wet season. The rainfall maps, therefore, and also the following table indicate broadly how cloud varies through the year.

Station	Latitude	Average cloud-cover in tenths	
		Dry season	Wet season
Timbuktu . . .	16° 41' N.	2-3	3-4
Gao . . .	16° 16' N.	2-4	5-6
Dakar . . .	14° 40' N.	3-4	6-7
Kouroussa . . .	10° 39' N.	2-3	5-6
Conakry . . .	9° 31' N.	2-3	5-7
Tamale . . .	9° 25' N.	3-5	5-8
Atakpame. . .	7° 32' N.	4-5	5-7
Porto Novo . . .	6° 28' N.	4-5	5-6
Accra . . .	5° 33' N.	4-5	6-7

In the north clouds cover more than four or five tenths of the sky during the wet season only, and even then clear patches and cloudless days are frequent. Nights are usually clear in both seasons. South of latitude 10° the average cloud cover is greater and, during the wet season along the Guinea coast, nights as well as days may be overcast. The cloud base, normally as low as 1,500 feet, may even be at ground-level during heavy storms, and continuous clouds often lie below the tops of hills.

At most coastal stations morning sea mists tend to make readings higher at that time. At inland stations afternoon readings are the

higher, except during wet months when the cloud-cover does not vary much through the day.

The most typical clouds are cumulus, heavy in the south-west monsoon, with their bases at about 2,500 to 3,500 feet, and lighter in the north-east trades about 1,500 feet up. The commonest rain clouds are heavy cumulo-nimbus, which mass in the monsoon and are frequently linked by stratus and nimbus.

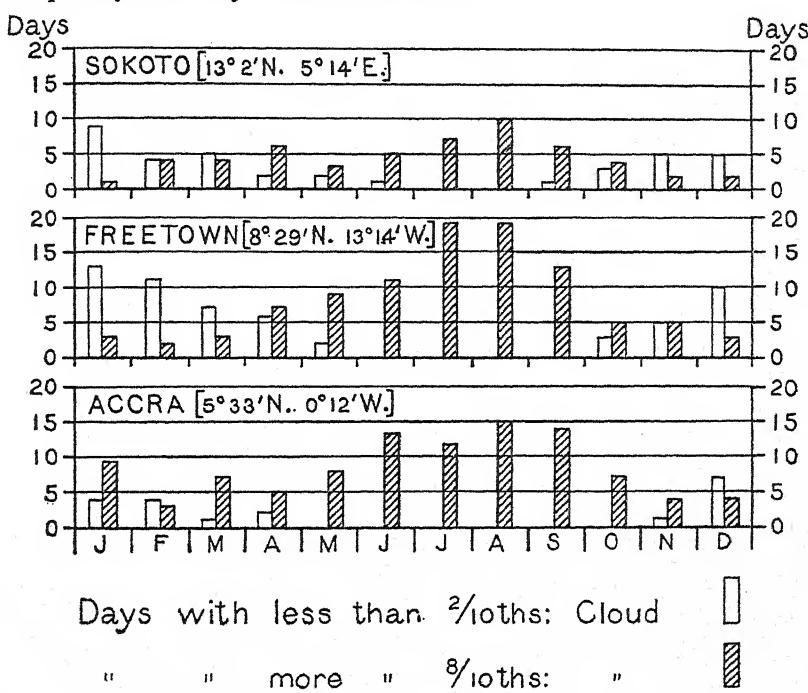


FIG. 33. *Cloud-cover*

Thunderstorms

During the dry season, in the interior and along the west coast, thunderstorms are uncommon. Southwards from the latitude of Cape Verde they become increasingly frequent, and may occur at any time during the wet months. They are most common and most violent towards the beginning and end of the rains. Sometimes their onset is accompanied by a wind-squall of, perhaps, gale force, and they are then known as tornadoes.

The following table, compiled from records over a number of years, shows the number of storms that may be expected in different latitudes at various times of the year.

Mean Frequency of Thunderstorms

<i>Latitude</i>	<i>Jan.</i>	<i>Feb.</i>	<i>Mar.</i>	<i>Apr.</i>	<i>May</i>	<i>June</i>	<i>July</i>	<i>Aug.</i>	<i>Sept.</i>	<i>Oct.</i>	<i>Nov.</i>	<i>Dec.</i>
17 $\frac{1}{2}$ -15°	0·0	0·0	0·0	0·1	1·0	4·3	7·0	7·6	5·0	1·6	0·0	0·0
15°-12 $\frac{1}{2}$ °	0·0	0·0	0·3	1·0	2·6	6·0	9·6	10·4	8·3	3·5	0·0	0·0
12 $\frac{1}{2}$ -10°	0·1	0·4	1·3	4·0	7·3	9·6	11·0	9·4	11·8	8·0	1·8	0·1
10°-7 $\frac{1}{2}$ °	0·2	1·7	4·0	7·3	10·5	12·0	8·0	5·8	9·4	10·6	5·8	0·7
7 $\frac{1}{2}$ -5°	0·8	2·8	4·8	7·0	9·5	6·7	1·8	1·3	3·4	6·8	4·8	1·3

TEMPERATURES (Figs. 34, 35, and 36)

Throughout West Africa variations of temperature from month to month are relatively unimportant. There is, however, a marked difference between the shade temperatures at coastal and interior stations, while the high ground of Fouta Jalon naturally has its effect. The significance of the figures tabulated below may be better appreciated if it is remembered that mean temperatures in south-east England are about 62° in summer and 39° in winter, while similar figures for New York are in the region of 75° and 30° respectively.

The figures in the following table cover most of the recording stations in each of the five regions mentioned. At stations which are abnormal for one reason or another the range of temperature may be larger by three or four degrees on the coast and by eight or nine inland.

	<i>Coast north of Dakar</i>	<i>Coastal lowlands south of Dakar</i>	<i>Fouta Jalon</i>	<i>Southern interior</i>	<i>Northern interior</i>
A	108-114	100-110	90-95	105-115	115-120
B	94-101	90-95	75-80	90-100	100-110
C	83-85	85-88	73-77	85-95	95-100
D	76-77	75-80	67-71	75-81	83-86
E	59-70	70-75	60-65	65-70	65-75
F	53-65	65-70	56-60	60-65	58-63
G	45-53	50-60	40-45	39-57	35-50

A = Highest recorded temperatures. E = Mean of daily minima.

B = Mean of monthly maxima. F = Mean of monthly minima.

C = Mean of daily maxima.

G = Lowest recorded temperatures.

D = Daily mean temperature.

Sun temperatures up to 125° are met with along the Guinea coast, while, inland, sun temperatures rise to 140° and ground temperatures to 160°.

The small range on the coastal lowlands and the lower tempera-

tures in Fouta Jalon are at once apparent from the table, as is the much greater range inland, which makes necessary special equipment and precautions to avoid discomfort alike from the excessive heat of day and the bitter cold of night.

In winter the interior is cooler than the coast and there is a general rise in temperature southwards. Thus January mean daily tempera-

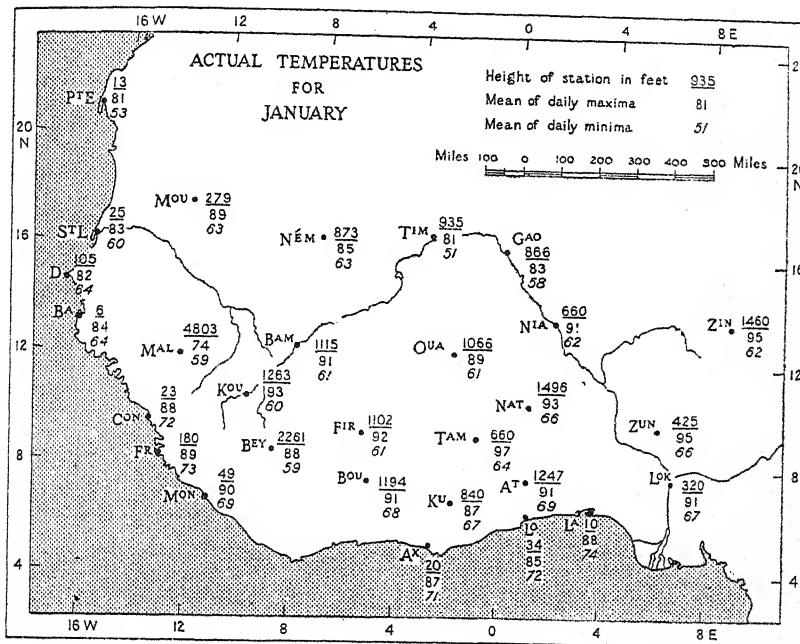


FIG. 34. *Actual Temperatures for January*

tures are 73° at Dakar and 80° at Conakry, 66° at Timbuktu and 79° at Natitingou. A considerable diurnal range of temperature results from the lack of cloud, especially in the interior, where at Timbuktu and Bamako, for example, early morning shade temperatures of 50° or 60° frequently precede afternoon temperatures of 100° or 105° . Coastal areas, as would be expected, have smaller variations (Dakar has a range of 18° , Conakry of 16° , Lome of 13°), but they are not without significance, and ranges of 30° to 40° are recorded occasionally.

In summer north Africa heats up with extraordinary rapidity. The coastal lowlands are cooler than the interior plateau and there is a general rise in temperature northwards. Thus mean temperatures in

July, varying between 77° along the Guinea coast and 79° at Conakry, are 83° at Dakar and 89° at Timbuktu. At the same time the diurnal range decreases everywhere and is particularly small on the south coast, where high night temperatures are very trying.

Temperatures do not fall to freezing-point below an altitude of 15,000 feet, although, naturally, the exact height varies with the seasons.

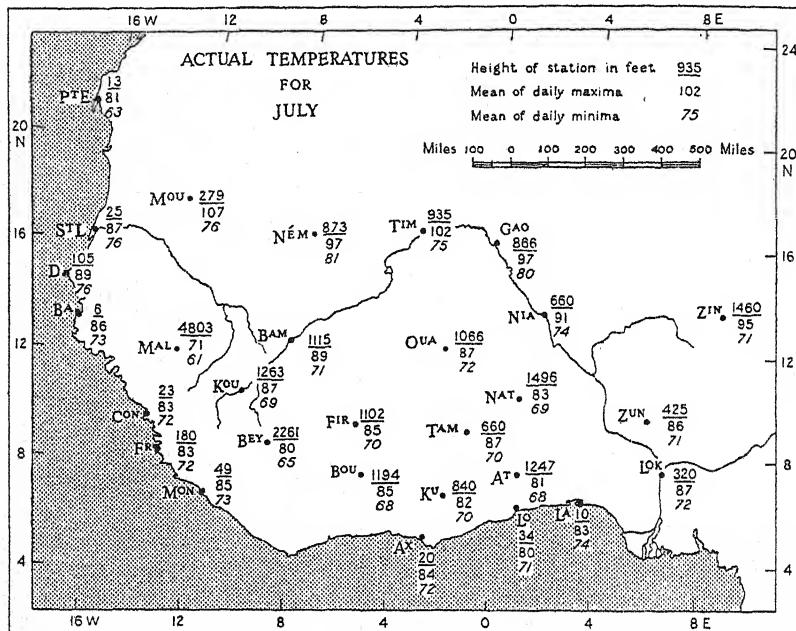


FIG. 35. *Actual Temperatures for July*

While the above outline is true of mean temperatures in the two seasons there are four noteworthy exceptions. First, to the north of Dakar summer daily maximum temperatures from February to November are markedly lower along the coast than they are at the same latitudes inland. This fact is due to the cool Canary current, and to sea-breezes from it, which tend to lower the temperatures along a narrow coastal strip. Second, temperatures are lower in all seasons on Fouta Jalon and the Guinea Highlands. Third, there is an anomalous seasonal fall in temperatures along the Guinea coast, where a distinctly cooler period intervenes in July and August. Fourth, temperatures in the interior fall with the onset of the rains. Temperatures rise rapidly through March and April, fall slightly

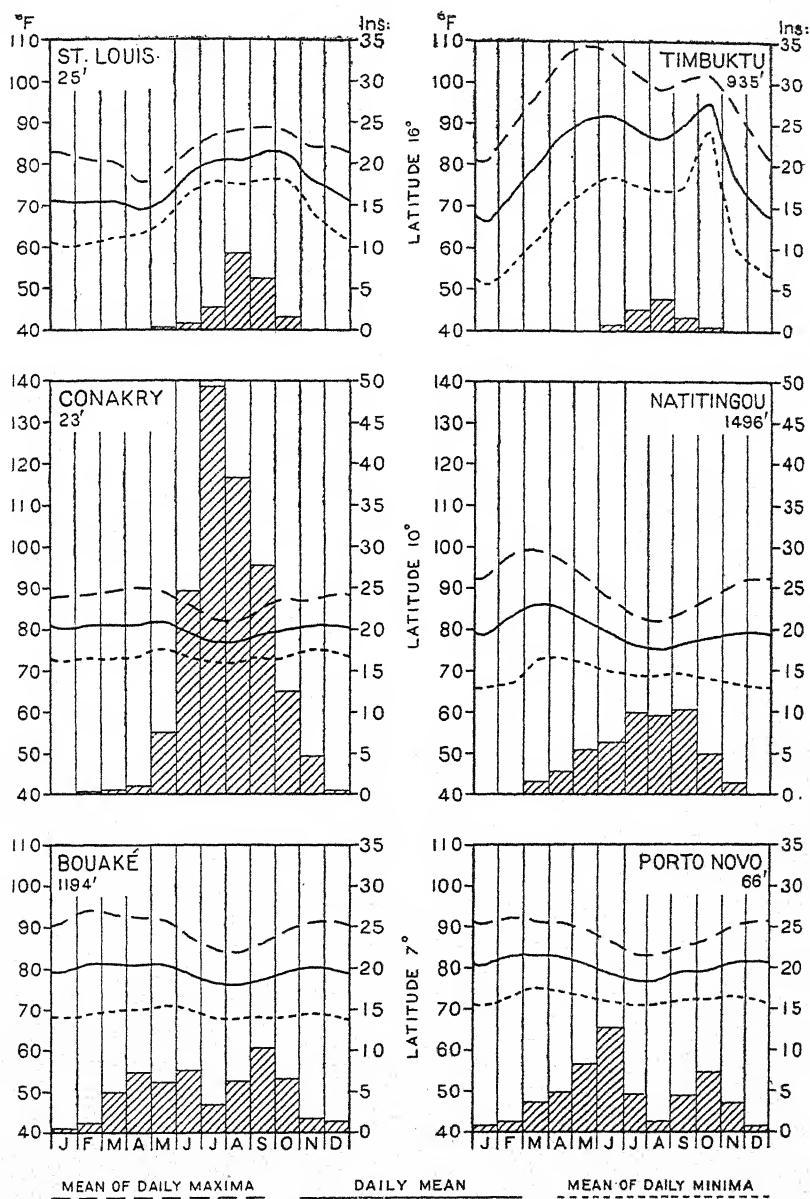


FIG. 36. Rain and Temperature

from May to August with the rains, and rise again in September, though not as high as in April.

Temporary variations are caused by rain-storms and tornadoes. Rain will lower the temperature a degree or two on any day in the wet season, and tornadoes cause sudden falls of 10° or more in a few minutes.

RELATIVE HUMIDITY

Throughout West Africa relative humidity is highest under the equatorial low-pressure belt and the south-west monsoon, and lowest with the north-east winds. It follows therefore that high humidity is to be expected on the coast south of Dakar all the year, while in the interior there are greater variations. The following table bears this out, though the figures are not necessarily the lowest and highest recorded: the latter frequently occur in August.

	<i>Mean relative humidity percentages</i>			
	<i>January</i>		<i>July</i>	
	<i>a.m.</i>	<i>p.m.</i>	<i>a.m.</i>	<i>p.m.</i>
<i>(a) South-west and south coasts</i>				
Conakry	85	71	92	85
Freetown	78	70	90	87
Accra	82	84	85	85
Porto Novo	90	77	89	85
<i>(b) North-west coast and interior</i>				
Port Etienne	67	31	80	57
Timbuktu	39	29	68	46
Bamako	50	27	89	71
Beyla	68	31	94	84
Natitingou	43	22	81	75

Readings in Freetown and Accra are taken at 9 a.m. and 5 p.m., in Port Etienne at 8 a.m. and 1 p.m., and in the other stations at 8 a.m. and 6 p.m.

The high humidity of the southern coastal lowlands is particularly trying to Europeans because it is associated with high temperature. A few miles inland, where the tempering of sea- and land-breezes is lost, the sticky 'hothouse' atmosphere exhausts physical and mental energy. Special precautions have to be taken against fevers which flourish under these conditions, and against rust and mould—tins must be carefully handled, clothing well aired, and machinery well oiled. When and where the harmattan penetrates there is an abrupt drop in humidity and exceptionally low figures are recorded. The relief, pleasant at first, is soon lost in the extreme dryness which dis-

tresses man and beast; leaves turn yellow and drop, wood splits, and leather curls and cracks.

VISIBILITY, DUST HAZE, AND FOG

On the surface, visibility is good on the whole, though less so in the dry season. In the wet season visibility is very good (up to 30 miles) except during actual rain and in the low cloud mentioned above, and interruptions from this cause are of course less frequent farther north. In the dry season the harmattan, and the dust haze which accompanies it, limit visibility to between 5 and 15 miles; occasionally, however, visibility may fall to a few hundred yards. This dust haze is worst in the north where soils are light and sandy. Two causes of exceptionally bad visibility are sand storms and bush fires. The former are desert phenomena, and are seldom experienced south of latitude 14° N. While they are active visibility is limited to a few yards, and they leave behind them a dust haze which may last for days. Bush fires are common, at the end of the dry season, over large areas of the savanna and orchard-bush. Drifting smoke limits visibility up to 3,000 or 4,000 feet.

Fog occurs in mountainous country during the rains, and in forested areas and over lakes at night or in calm weather; it is dense only up to 200 or 300 feet, rarely reaches 500 feet, and is usually dispelled by mid-morning. It is, however, especially prevalent and persistent over the Canary current along the Mauritanian coast and, in calm weather and the dry season, along the Guinea coast. When the harmattan reaches the latter, fog may extend some way out to sea.

Vertical visibility is also good generally, but the characteristics of the equatorial easterlies are important in two respects: the residual dust haze carried in them from the harmattan creates a belt with poor visibility which may exist above excellent surface conditions; or, in complete contrast, its dryness may evaporate the clouds rising into it from a moister surface current, so that a relatively clear layer may lie above dense cloud.

LENGTH OF DAY (Fig. 37)

To those accustomed only to the seasonal variations in the length of daylight in temperate latitudes, the uniformity of day and night in the tropics will seem unusual. There are no long summer evenings. Throughout the year the sun rises and sets about 6 a.m. and 6 p.m. respectively, and the length of day is, therefore, about 11 to 13

hours all through the year. Twilight is also shorter than in temperate latitudes.

Table to show Longest and Shortest Days

	Earliest sunrise (early June)	Latest sunset (early July)	Latest sunrise (late January)	Earliest sunset (late November)
Lat. 20° N.	5.20 a.m.	6.43 p.m.	6.38 a.m.	5.19 p.m.
Lat. 10° N.	5.38 a.m.	6.25 p.m.	6.23 a.m.	5.35 p.m.

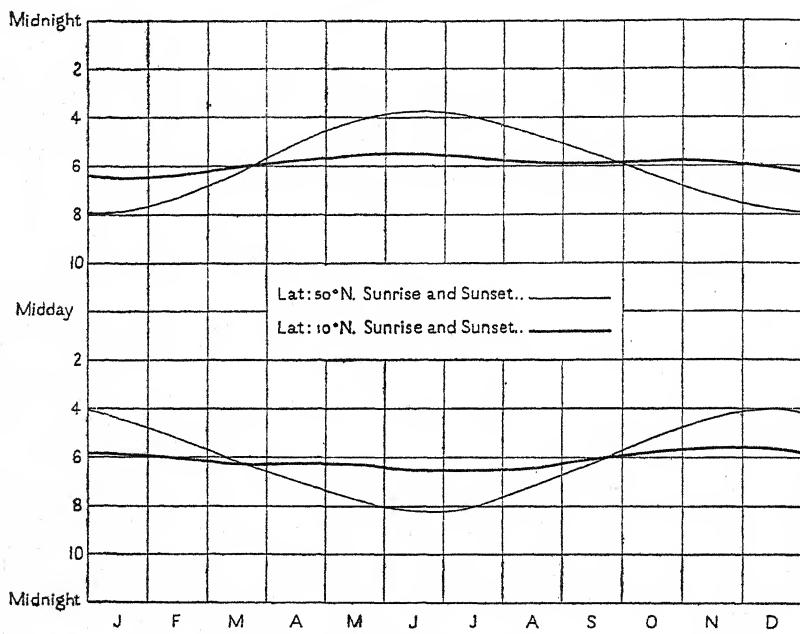


FIG. 37. *Sunrise and Sunset*

SWELL AND SURF (Plate 29)

The seasonal winds, in conjunction with the set of the coast and the relief of the foreshore, are responsible for the swell and surf along the West African coast. North of St. Louis the swell is almost always from the north. From St. Louis to Bathurst the swell is northerly for most of the year, but comes, increasingly, from the southern quadrants between June and September. South and east from Bathurst all the way to Nigeria the swell is generally from the south and southwest. Only on rare occasions is it very heavy.

Surf is heavy all along the coast. Apart from causing difficulty and danger to lighters transporting goods between the coast and ships

anchored some way off shore, it has been responsible for the bars which so greatly hinder navigation at the mouth of every river.

Percentage Frequency of Swell

	Swell from Quadrant				Swell from all directions			Total No. of obser- vations		
	1. NW.	2. NE.	3. SE.	4. SW.	5. Con- fused	6. None	7. Slight	8. Mod- erate		
<i>West Coast</i>										
January . .	59	27	1	1	7	5	49	35	4	598
April . .	77	11	1	2	5	4	30	57	4	557
July . .	45	8	10	17	10	10	45	32	3	722
October . .	54	19	7	8	7	5	57	28	3	713
<i>South-west Coast</i>										
January . .	25	8	25	13	23	6	62	9	0	671
April . .	22	2	29	18	15	14	61	10	0	624
July . .	0	0	51	35	9	5	59	25	2	679
October . .	4	3	51	24	13	5	63	19	0	748
<i>Ivory Coast</i>										
January . .	1	3	23	47	22	4	65	9	0	277
April . .	1	0	61	26	9	3	66	22	0	212
July . .	0	0	44	52	4	0	64	32	0	256
October . .	0	0	36	58	5	1	51	42	1	333
<i>Bight of Benin</i>										
January . .	3	0	23	42	32	0	63	5	0	57
April . .	0	0	31	44	14	11	59	16	0	73
July . .	0	0	13	67	19	1	40	37	3	144
October . .	0	0	25	61	14	0	46	40	0	154

Columns 1-6 add up to 100, and so do columns 5-9.

METEOROLOGICAL SERVICES

West Africa is reasonably well covered by a network of meteorological stations, both British and French. Methods of recording and tabulating observations, however, are not standardized, as, for example, in the definition of a 'rain-day', and published statistics are by no means uniformly reliable.

In 1931 French West Africa and Togo had 281 meteorological stations, of which 7 were listed as 'main' (*station principale*) and 65 as 'first order' (*station de premier ordre*). In 1939 the stations of Dakar, Bamako, and Abidjan were broadcasting up to five synoptic reports a day, Dakar for Mauritania, Senegal, and French Guinea, Bamako for French Sudan and Niger, and Abidjan for the Ivory Coast, Togo, and Dahomey. These broadcasts were amplified by similar reports from Lagos for British stations.

Detailed lists of the French stations, and such records as are available, will be found in the descriptions of the individual colonies in Volume II.

CHAPTER IV

VEGETATION AND FAUNA

VEGETATION

INTRODUCTION

IN the following account of the flora and vegetation of West Africa an attempt is made to give a clear picture of the plant life of the area as a whole, ignoring political boundaries as such. This general account is followed in Volume II by briefer accounts for the separate French colonies. Such a treatment is not only essential in order to obtain a correct perspective of the distribution of the plant communities but will also save much repetition. While it is at times useful to distinguish between flora, or the kinds (as classified into families, genera, species) of plants in any area, and the vegetation, or the grouping of plants into distinct communities, these two aspects of plant life will here be considered, in the main, together, with vegetation as the basis. Floristic studies are highly technical and, for the most part, cannot be carried out in the field. It is, however, true that they are indispensable to the study of vegetation and reference must from time to time be made to important species. As far as possible English or French names or both are given, and widely known native African names are also used. Unfortunately these common names often apply to more than one kind of plant, and for this reason, amongst others, botanical names in Latin are essential. These are added in brackets the first time a name is given in the vernacular and occasionally afterwards where precision demands. Only important species are named, and no attempt is made to give complete lists of plants for any area or for any community.

The known flora of West Tropical Africa consists of about 5,610 species, classified into 184 families and 1,470 genera. While these approximate figures are large when compared with some (but not all) temperate regions, they are probably below the average for tropical regions comparable in size. Botanically, the interesting features of the flora, apart from its diversity, are that it includes transitions between the Mediterranean and the tropical floras, that it shows the influence on distribution of the great tropical rain-forest centred in the Congo basin, and that it shows some connexions between the African and the American floras, though these connexions are probably less than would be expected from such a geological theory as that of continental drift as put forward by Wegener.

VEGETATION

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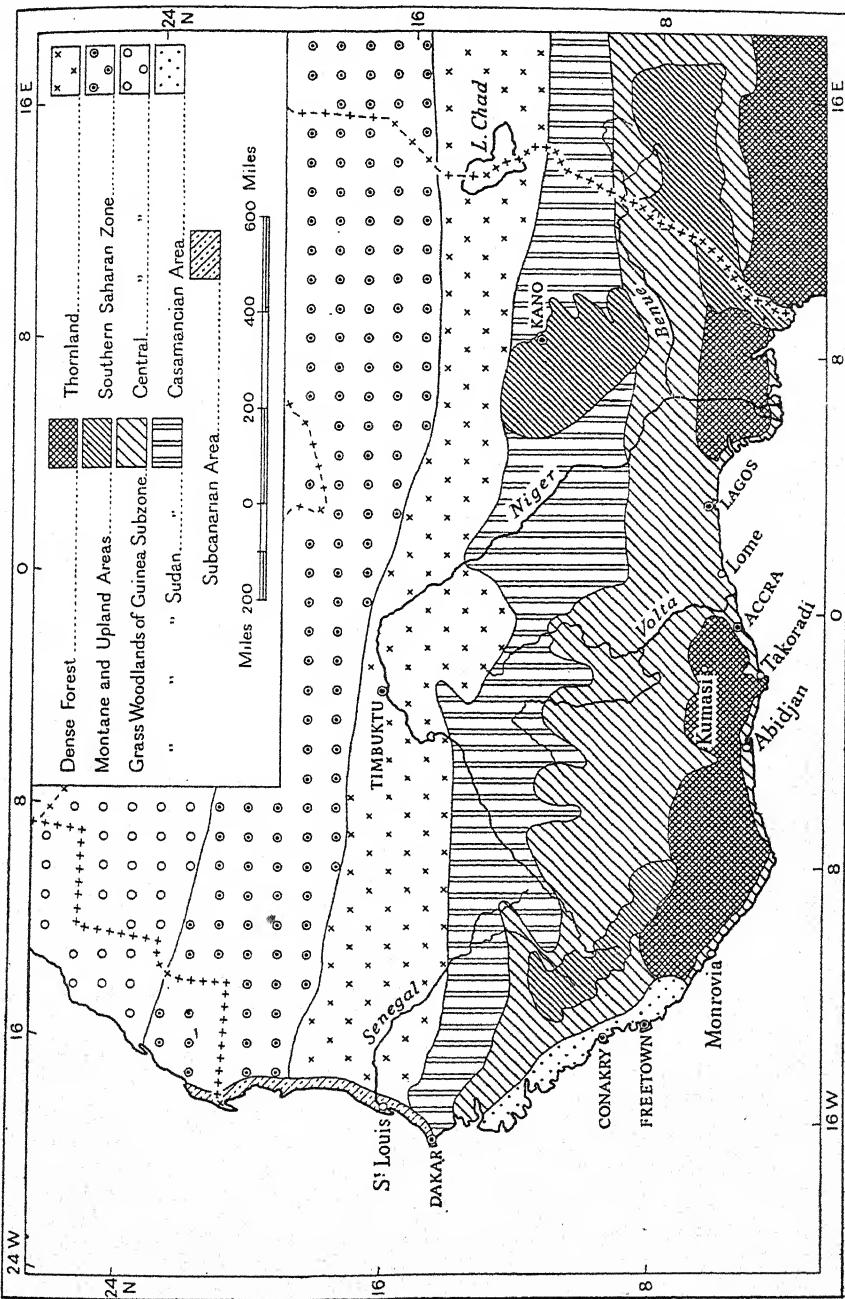


FIG. 38. Vegetation

The vegetation is very diversified and ranges from desert 'acheb' in the north to tropical rain-forest in the south. There is, however, no true high mountain vegetation, such as is found on the Cameroon mountain and on the mountains of east and central Africa. The main factor controlling the distribution of the commonest types of vegetation is climate, and especially rainfall. Since, in general terms and with local exceptions, rainfall increases from north to south, the main belts of vegetation are approximately latitudinal, running from west to east. It is, however, not only total annual rainfall but also its seasonal distribution which is important in controlling the distribution of the plant communities. Indeed, the clearest correlation can be seen between the length and intensity of the dry seasons and the plant zonation. Direct differential temperature effects are of quite secondary importance, since temperature is at an optimum for plant growth over practically the whole of the area. Altitude causes local modifications through modifications in rainfall. Soil variations (edaphic factors) also influence the vegetation, mainly through water-supply and salinity. Underground (telluric) water is locally important outside the wettest zones and increasingly so northwards. Biotic factors (the influence of animals, and especially man, and of plants themselves) on the vegetation will have to be referred to in some detail in the following account. Under optimum conditions of temperature and rainfall along much of the Guinea coast dense high evergreen forest develops and, unless artificially destroyed, effectively prevents the development or spread of any other type of community. There is no evidence that the native fauna has ever been dense enough markedly to influence the vegetation, but the direct and indirect effects of man's actions are, in parts of the region, comparable in importance with those of climate. Shifting cultivation, firing of brushwood and grassland, the maintenance of large flocks and herds of domesticated animals (sheep, goats, cattle, camels), the introduction and widespread cultivation of exotics, and the unintentional introduction of weeds have all very greatly modified the natural flora and vegetation. The three groups of factors, climatic, edaphic (soil), and biotic, are always intersecting and their past modifications and interactions have also a permanent influence on the plant life of the region. The interaction is rather clearly shown by the fact that the soil reaction (degree of acidity) shows a general zonation correlated with that of climate. In north Africa the majority of the soils are alkaline, whereas in Senegal and French Sudan they are slightly acid. In French Guinea and the Ivory Coast the soils show the strongest acidity.

While the structure and distribution of the plant communities can be closely correlated with the environment, the vegetation zoning must be based on the plant life itself. Thus, we find the following major belts from south to north: a narrow coastal belt of mangroves (very discontinuous) and strand communities, dense equatorial rain-forest, more and more deciduous, and then more and more discontinuous, forest, grass woodlands, thorn-land, subdesert, and desert. These belts have to be defined from their optimum development and their boundaries are rarely sharply marked. There is considerable diversity of opinion as to how many such belts it is most convenient to recognize under separate names, and even more diversity as to their nomenclature. Further, though it is quite clear that the main vegetation types, from dense forest to desert, run in 'belts' or 'zones' west to east, not only are these belts irregular in width and sometimes even more or less broken, but there are, within any one belt, differences of secondary order from west to east. This in part explains the different emphasis given by French and British authors respectively to certain aspects of the vegetation. Thus British botanists, and particularly foresters, have emphasized much more than the French the distinction between evergreen and deciduous forests. On the other hand, the French have tended to subdivide zonally, more than the British, the vegetation between the dense forest and the desert. The following table illustrates some of these points, the equations being approximate:

<i>Chipp (1930-3)</i>	<i>Grandidier (1934)</i>
Tropical and Equatorial Forest	= Dense Forest
Grass-Woodland	= { Equatorial Littoral Savanna Equatorial Continental Savanna South Sudanian (Guinea) Casamancian Sub-Canarian North Sudanian (Sudan)
Thorn Scrub	= Sahelian
Saharan	= Subsaharan
Barren Desert	= Saharan
Montane (in part)	= Foutanian

In the following account of the vegetation headings have been given as follows:

I. *Coastal Vegetation*

1. Mangrove-woodland.
2. Herbaceous strand community.
3. Sandbank forests.

II. Inland Vegetation

- A. Tropical evergreen rain-forests.
 - a. Floristic composition.
 - b. Structure and physiognomy.
- B. Modifications of the rain-forest.
 - a. Fresh-water swamp forests.
 - b. Mixed deciduous forests.
 - c. Montane forests.
 - d. Secondary rain-forest.
- C. Grass-woodlands.
 - i. Grass-woodland of the coastal areas.
 - ii. Inland grass-woodlands.
 - a. Guinea subzone.
 - b. Sudan subzone.
 - c. Casamancian area.
 - d. Sub-Canarian area.
 - e. Fringing forests.
- D. Thorn-land (Sahelian zone).
- E. Subsaharan or Southern Saharan zone.
- F. Desert zone.

Fig. 38

The range of the main types of inland vegetation is shown on the accompanying map, which is of a generalized nature and, though based on a simplification of the most up-to-date information available, may need modification as further field investigations are recorded. It does, however, show clearly the general west-to-east orientation of the main vegetational zones and the Togo-Dahomey break in the rain-forest belt. The coastal communities proper occupy areas too narrow (and often too numerous and discontinuous) to be shown on a map of this scale.

I. COASTAL VEGETATION

The coastal plant communities occupy a relatively narrow stretch along the shore except that, at river-mouths and in river-deltas, they may extend approximately up to the tidal limit. Under tropical climatic conditions the coastal vegetation is quite different from that of the coasts of temperate regions, but the conditions of the substratum and of exposure to maritime influences result in communities quite distinct from those found inland under the same climate. Three main types of vegetation are distinguishable: mangrove-woodland, herbaceous strand community, and coastal scrub.

i. Mangrove-woodland (Plate 30)

This occurs wherever there are stretches of mud which are protected from direct rough-wave action but are flooded with brackish water and subjected to rise and fall of the tide. It extends generally along the West African coastline wherever these conditions occur, at the mouth of every creek and up every river as far as the tidal limit. While the local distribution thus depends mainly on the substratum, and especially on its saline water content which prevents competition with rain-forest and with fresh-water swamp forest, the general distribution is climatically controlled, and mangrove-woodland does not succeed in West Africa in areas with less than 70 inches of annual rainfall, while the finest mangrove-woodlands occur where the rainfall reaches or exceeds 100 inches a year.

The mangrove-woodland is evergreen, closed, and of a low to medium height. The tallest trees, growing under the most favourable conditions, do not attain more than 75 feet and the average height is between 30 and 45 feet. Diameters up to $2\frac{1}{2}$ feet have been recorded. The trees grow thickly together and the stems are supported above the mud on stilt-like roots. These roots and aerial branches, which descend from the crowns at every angle, make an intricate tangled mass of growth, a network of 'stick-bush' over the muddy salt water, or, at low tide, over the stinking bluish-black shiny mud which fills in all spaces around the bases of the stems and among the roots. At a distance this mud appears rather like a solid ground surface, but is too soft to walk on. Stems and roots are too slippery to offer a foothold or support, and from the moment a mangrove-woodland is entered life is made unbearable by pestilential clouds of mosquitoes. The stilt or prop roots contain large air-spaces and orifices for gaseous exchange, as the supply of oxygen in the soil is scarce; they are also particularly well suited to fixing the tree in the treacherous mud. Several species develop special respiratory roots which grow upwards and can be seen protruding above the slimy mud. The typical mangrove trees are 'viviparous'; the seedling, before it falls, is a fully developed dart-shaped or club-shaped young plant which drops point downwards into the mud below, in which it sticks upright, the shoot-end uppermost. Around the edge of the swamp, and even farther out in the creek, the young mangrove seedlings can be seen sticking out of the mud like asparagus shoots, their slender tops swayed by the current, while the seedling is held fast by its weighted base. This 'vivipary' and self-planting enables seedlings to establish themselves on the soft mud within

considerable limits of tidal scour. The mud is rich in organic matter and in moisture but is heavily salt-impregnated.

Mangrove-woodland lines the creeks on both sides, covers the smaller islands, and fringes the larger. The marginal trees are usually the shortest and most branched, the branches frequently arching over and touching the water at flood times. Towards the centre of a mangrove-woodland the trees are taller with more slender and less branched stems. The canopy is usually dense; the leaves are dark green and shining; the trunks and larger branches are often pale grey. The bark and fruits are rich in tannin, and the wood is valuable for constructional purposes where there is a risk of attack from termites or molluscs. It also makes an excellent fuel because of its high calorific value.

There are relatively few species represented in the mangrove-woodlands. The common mangrove (*Rhizophora racemosa*) appears farthest out in the saline waters, and, occurring in great quantities, may form almost pure forest. It is, however, especially on the landward side, frequently mixed with salt-bush (*Avicennia nitida*) and white mangrove (*Laguncularia racemosa*), and the monkey apple (*Anisophyllea laurina*) may also occur. In the pure mangrove-woodland few other plants than the specialized mangroves themselves can grow and there is an absence, or a scarcity, of such typical features of many tropical forests as lianes (woody climbers) and epiphytes (plants growing on trunks and branches), except for the lowly plants such as lichens and algae. The prop roots and stem bases may be thickly covered with molluscs. The 'sudd plant' (*Pistia stratiotes*) may be washed down from the creeks above.

The transition from mangrove-woodland to another community is generally a more or less gradual one. Higher up the creeks salinity of the water and mud becomes less pronounced, even before the tidal limit is reached, and other plants mix with the typical mangroves. Screw-pines (*Pandanus candelabrum*) begin to occur and in places gradually gain the upper hand. The appearance of the vegetation changes greatly, and the rather monotonous mangrove-woodland becomes replaced on the marshy ground by a thick scrub of screw-pines, raphia palms (species of *Raphia*), and a wild spiny-leaved date palm (*Phoenix reclinata*). Climbing and clambering plants make their appearance, orchids grow on the tangled branches, and the delicate colouring of their flowers alternates with the yellow of the flowers of the ochro or lady's fingers (*Hibiscus esculentus*), a member of the hollyhock family whose immature mucilaginous fruits are used as a

soup vegetable. Other associated plants are: species of rikio (*Uapaca*), bahia (*Mitragyna stipulosa*), oil-bean tree (*Pentaclethra macrophylla*) which is frequently known as *arbre à semelles* in the French colonies, and rouin or rattan palm (*Calamus deeratus*). The riverain belt of the rattan palm often extends some distance inland into the forest area and makes entrance to it from the water difficult.

2. Herbaceous Strand Community

The herbaceous strand community appears on sandy sea-fronts from the limit at which normal inland vegetation (scrub, forest, or savanna) ceases on approaching the sea. It occupies the width of the strand as far as the water permits and is always ready to advance on to a newly built-up sandbank or spit, as soon as this is sufficiently stabilized to be more or less permanently above water. There is no humus and no shade, except for an occasional coconut palm or the spiny-leaved date palm. From morn till night the sun blazes on the exposed sand, and the heat is sufficient to blister one's feet through the soles of boots during a short day's march along the sea-front. The vegetation is bathed in sea-spray at every tide and is enveloped by the moist sea-breeze. There is no extensive and continuous carpet of plants; but succulent erect herbs, partly woody and partly herbaceous tufted plants, creeping herbs and grasses, which bind the sand with long extended springlike shoots or partly buried horizontally extending stems, grow closely together, singly or in small isolated groups. Occasionally dwarfed bushes are invaders from neighbouring communities. The most widespread plants are *Ipomoea pes-caprae* and *I. repens* (species of the sweet potato and morning glory genus), sedges (*Cyperus maritimus*, *Kyllinga peruviana*, *Mariscus coloratus*), spurges (species of *Euphorbia*), and seaside sword bean (*Canavalia obtusifolia*).

3. Sandbank Forests

On sandbanks and sand surfaces herbaceous communities are sometimes replaced by, or alternate with, areas of scrub or inferior types of evergreen forest, often very shrubby in appearance and sometimes open and patchy. There are few large trees, but much scrubby evergreen growth composed of coarse grasses and myrtle-like or heath-like shrubs, with which are associated stunted specimens of larger growing species. Common plants of this 'forest' are screw-pines, spiny-leaved date palm, alligator apple (*Anona palustris*), species of

Phyllanthus (members of the *Spurae* family), and species of *Ixora* (members of the Coffee family). After rains a considerable number of annual plants, of a savanna type, especially members of the Pea family, spring up. On coastal sandy areas near towns various exotics have been introduced amongst the native vegetation, for example: beefwoods (species of *Casuarina*), Indian almond (*Terminalia catappa*), *Barringtonia acutangula*, and cashew nut (*Anacardium occidentale*). Some of these, especially the last, have spread rapidly and are now decidedly characteristic of certain sandbank forests. Where tropical rain-forest approaches the shore, sandbank forest may merge gradually into it.

II. INLAND VEGETATION

A. Tropical Evergreen Rain-forest

(Plates 31 to 33)

This has been given various names and has been variously subdivided. In the account given here it is simply referred to as rain-forest. It is the characteristic forest of moist lowlands in tropical regions, and ranges from sea-level to approximately 2,500 feet altitude. The correlated climatic conditions are: high and constant temperature, annual precipitation from 60 to 250 inches or more, dry season lacking or short, and humidity high. These allow the development of a continuous, dense, closed, evergreen forest of trees and other plants needing humid conditions. The trees are very tall, have plank-butresses, large leaves with drip-tips, and are interlaced and tangled with lianes. Numerous epiphytes grow on the branches and even on the leaves of the trees and other woody components, while flowering from trunks and large branches is not uncommon.

In West Africa, the rain-forest forms a belt either immediately inland of the coastal communities or separated from them by a zone of grass-woodland of varying width, and stretches, with one important break, from the border of the Cameroons to south-eastern Sierra Leone. The width of the belt varies and is greatest in Liberia and the western Ivory Coast. The main break occurs in western Nigeria, Dahomey, Togo, and eastern Gold Coast. In these areas the true rain-forest is either absent or occurs in patches, mostly of a relict nature. At its northern limit in Sierra Leone it is much reduced in area and occurs as isolated forests. To the south-east the West African rain-forest merges into the great forest of French Equatorial Africa, which is essentially continuous with that of the Congo basin.

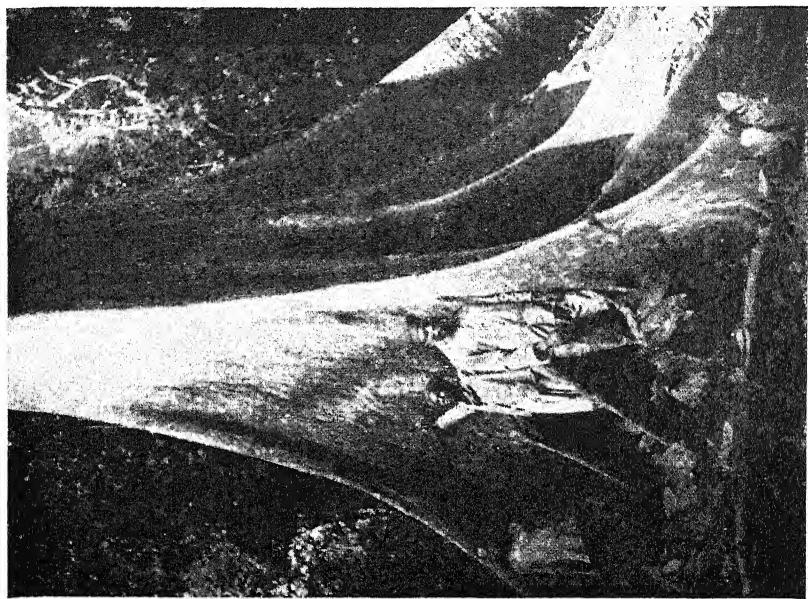


30. *A mangrove swamp*

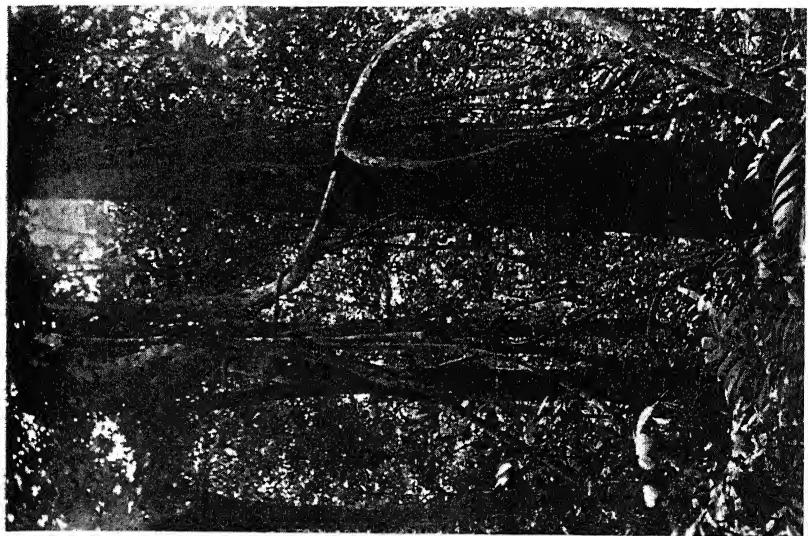


31. *Dense forest in French Guinea*

33. Buttressed base of *Parkia bicolor*



32. Primateval forest with lianes



Some authors have concluded that the rain-forest belt in West Africa was formerly continuous and that its present discontinuity is due to deforestation by human activities. Others have postulated secular climatic changes as a cause of the restriction of area. Still others doubt if the rain-forest has ever occupied the considerable areas claimed for it but from which it is now absent.

a. Floristic Composition of the Rain-forest. The African rain-forest is not floristically uniform throughout, and the West African rain-forest is probably poorer in species than that of French Equatorial Africa and the Congo basin. It has been estimated that there may be as many as 3,000 species of woody plants in the African rain-forest as a whole. Some of these extend throughout practically the whole area, or at least through large parts of it; others are of more limited range, and some are at present only known from a single locality or from one or two. Possibly about 1,000 species of trees and large shrubs occur in the West African rain-forest, though this may be an underestimate. The forest flora, not entirely rain-forest, of the Ivory Coast alone is known to contain 600 species of 'trees' with a diameter of 4 inches and upwards at 3 feet from the ground. These belong to 61 families and 276 genera. These figures are given because they emphasize the diversity of the woody vegetation. In many temperate regions forests are relatively uniform over large areas, with woods of oak, beech, pine, spruce, &c. In the tropical rain-forest the species are mixed in very large numbers and dominance of one or of a few kinds is absent, rare, or merely relative. This is a very important factor in the economic exploitation of rain-forests, since individuals of valuable species may be widely scattered, necessitating much labour in their extraction. The most important families in providing trees of large size are: the Pea family (*Leguminosae*), the Spurge family (*Euphorbiaceae*), the Madder family (*Rubiaceae*), the Mulberry family (*Moraceae*), the Sapodilla family (*Sapotaceae*), the Sterculiad family (*Sterculiaceae*), the Soapwort family (*Sapindaceae*), the Meliad family (*Meliaceae*), and the Rose family (*Rosaceae*). Some trees of the largest class and some of economic importance belong to other families. The most important single family is the Pea family. A very small selection of important trees in the rain-forest is given in the following table. The selection has been made on the basis of size, conspicuousness, wide distribution, and economic value. Names are given in the vernacular where they have a fairly wide usage which, for some African names, has been considerably extended since European occupation.

<i>Botanical name</i>	<i>English and/or French names</i>	<i>Native name</i>	<i>Height</i>	<i>Diameter of trunk</i>
<i>Parkia bicolor</i>	..	lo	..	..
<i>Piptadenia africana</i>	..	dabéma	Up to 180 ft.	6-8 ft.
<i>Oldfieldia africana</i>	African oak	..	..	..
<i>Mitragyna ciliata</i>	African linden	bahia	110 ft.	3 ft.
<i>Tilleul d'Afrique</i>				
<i>Mimusops heckelii</i>	..	makoré	150 ft.	3-6 ft.
<i>Triplochiton scleroxyylon</i>	African maple	samba	160 ft.	6-7 ft.
<i>Pterygota macrocarpa</i>	..	koto	100 ft.	..
<i>Guarea cedrata</i>	Pink African cedar	bosse	110 ft.	Up to 4 ft.
<i>Entandrophragma cylindricum</i>	West African cedar	aboudikro	..	Up to 6½ ft.
<i>E. angolense</i>	..	tiama	120 ft. or more	6-7 ft.
<i>Chlorophora excelsa</i>	African teak African oak	iroko	180 ft.	5 ft.
<i>Alstonia congensis</i>	Pattern wood tree	..	130 ft.	3-4 ft.
<i>Terminalia superba</i>	..	fraké	160 ft.	3-5 ft.
<i>Ceiba pentandra</i>	Silk-cotton tree	..	150 ft.	6 ft.
<i>Lophostoma procera</i>	Fromager			
<i>Pycnanthus kombo</i>	Red oak Wild (or false) nutmeg	azobé	90 ft.	4-6 ft.
<i>Uapaca heudelotii</i>	Arbre à suif	..	140 ft.	4-5 ft.
<i>Musanga smithii</i>	..	rikio (name used generically)	60 ft.	3-3½ ft.
<i>Pentaclethra macrophylla</i>	Umbrella tree Parasolier	..	60 ft.	1-2 ft.
<i>Ricinodendron africanum</i>	Oil-bean tree Arbre à semelles	ovala	80 ft.	Up to 3 ft.
<i>Elaeis guineensis</i>	African wood-oil-nut tree	eho	..	Up to 4 ft.
<i>Spathodea campanulata</i>	Oil palm African tulip or flame tree	..	100 ft.	Up to 3 ft.
<i>Loeseneria klaineana</i>	African walnut	..	140 ft.	5 ft.

The distribution of the different tree species is very variable. A few, like the iroko, have a vast range, covering nearly the whole extent of the rain-forest, from the sea coast to the northern limits. Some species have a wide total range, but their distribution is discontinuous and even extremely patchy. A large number of the trees have, so far as is known, a very localized distribution. The underlying causes of peculiarities of range are rarely known. The dense forest with its optimum conditions for plant growth means extreme competition between individuals and between species. Sometimes variations in climate and soil, and especially in water content of the latter, underlie the distribution of some species, although of secondary importance to the forest as a whole. It seems probable, however, that historical causes, accidental in the sense that they have no regular

recurrence, have also often played a part. The tropical African rain-forest is undoubtedly old, even in a geological sense, and in the course of time some widely dispersed seeds find gaps here and there in the forest where they can germinate and the species establishes itself in a new locality.

b. Structure and Physiognomy of the Rain-forest. The life of the mature dense rain-forest is controlled by the tree canopy acting mainly through the light factor. The canopy itself usually shows some stratification. Giant individual trees project above the general level, but for many areas three fairly well-defined stories of trees are recognizable at 120–150 feet or more, 50–120 feet, and up to 50 feet respectively. The great height of many of the trunks before they begin to branch makes them appear narrower than they really are. The density of the tree growth may be judged from observations made in the primary forest of the Ivory Coast, where counts made in different parts showed from 145 to 231 trees per acre having diameters ranging from 4 inches to 3 feet. Beneath the tree canopy as a whole there may be ill-defined shrub and herb strata, though these are often extremely poor, except in secondary forest. Many of the trees have woody plants climbing up them and often stretching from tree to tree, linking up the individual canopies into an inextricable mass. These lianes, as they are called, belong to various families and genera and are the worst obstacles to movement through parts of the primitive forest. The traveller who tries to make his way through the forest constantly finds his path barred by massive lianes and by great trees whose crowns of thick foliage are so densely interlaced and interwoven by lianes as almost to shut out the rays of the tropical sun overhead. It is like passing through the mysterious gloom of an immense, almost impenetrable, vault supported by gigantic pillars. The intruder scarcely sees the vault, or the large trees, or the great lianes, since the leaves and stems of innumerable little lianes and creepers form a thick curtain which lines the wall of bushes and shrubs. He proceeds between two compact walls of verdure and sees only low branches and enormous fallen trunks over which he scrambles with difficulty. Occasionally a flower, of some lily-like plant or ground orchid, brightens the gloom. Streams flowing through the forests form aquatic paths, whilst, when a river-bank is reached, the vaulted canopy is cleft apart displaying the edge of the forest along the opposite bank; a prodigious confusion of vegetation, beautiful in its tropical splendour and abundance, and brilliant with the scarlet young leaves of many trees.

This description does not apply to every part of the rain-forest but provides an average picture. In some areas the extreme density of the general canopy so reduces the light beneath it that the quantity of smaller woody plants is insufficient to impede progress on foot, though giant trunks and their buttresses and larger lianes make frequent detours necessary. On the other hand, areas uprooted by a tornado and, often of very common occurrence, those showing secondary growth following shifting cultivation, may be literally impenetrable without mechanical aids.

Mention must be made of some other characteristics of the rain-forest. Many of the larger trees have buttressed trunks. The form of the 'buttresses' is characteristic of the species, but the degree of their development varies with age and the local conditions. The buttresses are, in the main, of root-nature, though much remains uncertain as to their origin, growth, and functions. A very common form is for the base of the trunk to be strangely fluted by winged buttresses rising three, four, or more yards above the soil, and spreading out widely around the tree at soil level. The diameter of the trunk proper often diminishes from the upper point of the buttresses downwards to the soil. In some species the tree may even appear as if raised by the buttresses above the soil. As an extreme, seen in some of the rikios, the bole is supported by a mass of exceedingly abundant aerial roots.

It is typical of the undisturbed and mature parts of the rain-forest that the development of ground herbs is meagre, or at least of only very local and secondary importance. There is no extensive 'field-layer' such as is characteristic of many open or deciduous types of forest. Dead leaves are rare on the surface of the soil. Almost as soon as they fall they are attacked by insects or invaded by fungus mycelia¹ and soon destroyed. One, at least, of the fungi which cover all plant debris in the wettest seasons has a phosphorescent mycelium¹ so that at night the forest soil gives out a pale clear light. The Ginger family (*Scitamineae* in the broad sense) and the Acanthus family (*Acanthaceae*) provide the commonest ground herbs. Ferns do not form large groups, though a number of different kinds occur. On the other hand, plants living on the trunks and branches (epiphytes), though often not obvious from the ground, are frequently numerous in the upper portions of the canopy. Their need for light determines their high position, while they show various structures adapting them to utilize the atmospheric moisture and the humus-making debris which they themselves often help to collect. These epiphytes

¹ Mycelium is the vegetative body of a fungus, as opposed to its fruit body.

include numerous ferns, aroids, and orchids. There are also species of fig (*Ficus*) whose seeds germinate on the branches of trees. The resultant seedlings produce two kinds of roots: the one kind grows down to the soil and the other kind forms clasping roots which grow round the host and eventually strangle it. By the time the host is killed the roots reaching the ground are usually strong enough to support the canopy of branches and foliage. Another interesting feature of the rain-forest, obviously connected with the high atmospheric humidity, is the growth of lower plants (cryptogams) on the leaves of trees and shrubs. There is often a dense growth of mosses, liverworts, and algae forming a film on the surfaces of the large, broad, entire leaves which form the commonest leaf type of the rain-forest.

The typical rain-forest, as a unit, is accurately described as evergreen in the sense that the trees do not shed their leaves *en masse* with the oncoming of a cold or dry season. There is no season when the forest is bare, or even relatively bare, of foliage. There are, however, many variations of leaf-shedding from one species to another and even from one individual to another. Many trees are evergreen since the production of new leaves keeps pace with the gradual casting of old ones. Some trees shed all their foliage at one or other period of the year, but this leaf-fall is frequently irregular and appears to depend more on internal rhythms than upon changes in the external environment. Thus, not infrequently, one tree may be more or less bare of foliage while another of the same kind may be in full leaf. Moreover, with many trees, the period without leaves is very short. Flowering and fruiting also occur at irregular times in the mature forest, and for this reason, and also because of the height and density of the tree strata (including the lianes and epiphytes), neither flowers nor fruits are conspicuous features.

The primeval tropical rain-forest is a community in maximum biological equilibrium with its environment. As a result no space is available for the entrance and establishment of foreign species. The almost infinite complexity of these forests safeguards them against the majority of natural calamities, such as epidemics of insect pests and fungal diseases. The prevalent moist conditions prevent the spread of fires. The density of the forest, its several stories, the variety of composition, the flexible stems and foliage of many of the trees, and the anchoring woody climbers make the forest, as a whole, proof against all except the most violent and prolonged storms. The rain-forest does not contain within itself the seeds of its own decay or the means of

successional change. The great mixture of tree species ensures a kind of natural rotation in any single part of the forest, and soil exhaustion, which may be a marked feature with pure communities, is absent. These primeval forests are not the product of the soil, since in the equatorial and tropical regions very poor soils may carry magnificent trees. It is, indeed, more true to say that the soil is the product of the forest and, when the latter is destroyed by man, initial soil fertility is rapidly lost. The result is the process of shifting cultivation, whose effects are considered below.

B. *Modifications of the Rain-forest*

(Plates 34 and 35)

The more marked natural modifications of the widely spread rain-forest in West Africa may conveniently be grouped under three headings: fresh-water swamp forests, 'mixed deciduous forests', montane forests. The first occur locally at scattered points where the soil is continuously or regularly waterlogged; the second coincide with climatic changes towards the northern margins of the dense forest belt; the third is also a matter of climatic change, but such as is due to increased altitude.

a. *Fresh-water Swamp Forests* occur especially where creeks extend inland above the tidal limit, in natural depressions, and in the neighbourhood of rivers and streams within the rain-forest belt. Transition from mangrove-woodland to fresh-water swamp forest has already been referred to, and the composition of riparian woodland inland from the mangrove-woodland given. In many of the fresh-water swamp forests huge heavily buttressed trees are conspicuous and epiphytes are particularly numerous. The red oak (*Lophira procera*) and various legumes and rubiads (especially *Mitragyna stipulosa*) are common. Palms are often a characteristic feature, and species of *Raphia*, *Calamus*, and *Phoenix* may sometimes form pure, or almost pure, communities. Undergrowth is sometimes dense and impenetrable when the tree canopy is discontinuous. If inundation is more or less permanent, aquatic and marsh plants may be numerous.

b. Such a thing as a '*Mixed Deciduous Forest*', and even the phrase itself, have been much disputed in connexion with those portions of the dense forest belt of West Africa which occur towards its northern limits. As the climate becomes somewhat drier northwards, but still retains such features as enable high dense tropical forest to develop, there is an increase in the number of trees shedding their leaves

annually. Generally there is no abrupt transition from an evergreen to a deciduous type, and the degree to which completely deciduous forests replace evergreen rain-forest apparently varies from colony to colony. These facts account for the considerable discrepancy between authors in their recognition of subdivisions and in the emphasis placed on subdivisions. In order to distinguish mixed deciduous forest from rain-forest it is convenient to define the former as consisting of fine tall trees, mostly without foliage for a portion of the year, and as having an evergreen undergrowth. Some 75 per cent. of the top canopy is deciduous during the dry season, while the under canopy remains evergreen. These forests occur mainly where the annual rainfall is between 50 and 70 inches. On their southern limits the mixed deciduous forests merge imperceptibly into the typical rain-forest, while on their northern limits they give way, often abruptly, to grass-woodlands or savanna forests, especially where cultivation has destroyed intermediate stages. As with the rain-forest, the absence of a grass field-layer prevents the entrance or spread of fires. Although they contain a wealth of large timber-trees, the mixed deciduous forests have not been exploited to the same extent as the rain-forest. This is due largely to the fact that they are remote from the streams and rivers suitable for floating timber. In these forests there occur many rain-forest species which, however, here show more regular leaf-fall. The African maple and the African teak have the greatest range, while other important trees are the bark-cloth tree (*Antiaris africana*), the silk-cotton tree, the orange-barked terminalia (*Holoptelea grandis*), the dabéma, the African wood-oil-nut tree, the fraké, and several mahoganies (*Khaya* spp.). In the lower strata numerous legumes occur. Many of the trees have large buttress roots, but giant woody climbers are less numerous than in typical rain-forest, though smaller and more thorny creepers may make the forest still less penetrable.

c. *Montane Forests* are of very limited extent in West Africa. There are no high mountains to show zones similar to those of the Cameroon mountain or of the mountains of central or east Africa. There are one or two areas within the dense forest zone which deserve special mention and where altitude modifies climatic conditions and hence plant life. Towards the eastern boundaries of West Africa high ground merges into the hilly region of French Equatorial Africa, and some areas here have vegetation with some distinctive features which can be correlated with higher altitude. In the west, the broad belt of higher land in French Guinea stretching to the western Ivory Coast,

from Fouta Jalon southwards to Man, has numerous peaks, some of them relatively high, and forms a second montane area. None of the peaks in either area rises to the climatic tree limit.

The forests of the Oban hills and of the Sonkwala hills in Southern Nigeria appear to be more related to those of the Cameroons than to those of West Africa. They are largely of a transition type from evergreen rain-forest to mixed deciduous forest. In the Oban hills the evergreens predominate and floristically the forests are rich. Only towards the summits are there any signs of wind dwarfing, and although mosses and lichens are very common throughout, there is no 'mossy forest' or 'elfin forest'. On the Sonkwala hills much of the original forest has been destroyed and is replaced by a savanna or grassland type of country. A number of east African species occur on these hills. The Bauchi plateau area in Northern Nigeria also has a distinctive flora, but not of a rain-forest type.

Fouta Jalon, in the broad sense, is a series of sandstone plateaux frequently dominated by massifs of eruptive rocks and weathered outcrops of horizontal sandstones. The sandstone is often covered by a very dry layer of lateritic ferruginous conglomerate. Wherever, on the flanks, in the valleys, or even on the plateaux, soil has been able to form and maintain itself, lush dense rain-forests or mixed deciduous forests occur, although many are disappearing under human action. Most often, however, under present conditions, the upper parts have a peculiar herbaceous and sub-shrubby flora of a character unlike any other in West Africa. Most of its constituents are adapted to withstand drought—drought of the often almost bare, and at times baked, substratum, and not of the climate as a whole or as measured in inches of rain. In this area there are many rare plants, endemics (i.e. found nowhere else in the world) or of very local distribution. Some of these are decidedly archaic; some (as the bromeliad, *Pitcairnia feliciana*) show American affinities; some (as species of *Erica*, *Romulea*, and *Gladiolus*) may represent extensions from East Tropical Africa or the Mediterranean. The higher summits are frequently clothed with a remarkable sedge (*Catagyna pilosa*, also known as *Eriospora pilosa*), locally called 'devil-grass', which flourishes in the narrowest fissures of granite and gneiss and grows in spaced tufts, from less than 1 to over 3 feet in height, with almost thread-like back-falling leaves reminiscent of large horse-manes. The plant collects debris and makes humus, forming thus a true soil on which other plants can grow. In some places the forest progresses on to this soil, but much more often a grass savanna with scattered shrubs and

trees succeeds the devil-grass. The establishment of high forest is often prevented by recurrent fires.

The Guinea Highlands to the south of Fouta Jalon proper also have forested slopes, with the forest sometimes of the mixed deciduous but more often of the rain-forest type. The forests of the higher summits themselves are composed almost entirely of only one species of large tree, the Guinea plum (*Parinari excelsa*), whose hemispherical canopies touch one another and, from above, look like oaks. The forests are very humid, and mosses and lichens are abundant. Devil-grass communities occur on the rocky exposures. The irregular, often patchy, occurrence of rain-forest and mixed deciduous forest makes the region a peculiar one from the vegetational standpoint.

d. Secondary Rain-forest. The tropical evergreen rain-forest exists under climatic conditions which are the most favourable in the world for tree growth. Consequently woody plants spring up quickly after the destruction of any portion of the forest. The natural agents of destruction act very locally and temporarily and result in little more than small-scale but continuous replacements of individuals or small patches. This is largely owing to the high humidity making extensive fires impossible or very unusual. Shifting cultivation by natives has different and longer-lasting effects. Native methods of cultivation in the closed forest usually involve the destruction by axe and fire of much of the woody vegetation on the selected site. This destruction is most often incomplete. Giant trees too difficult to cut down with primitive tools, and trees of economic value, are frequently left untouched, while only herbs and small woody plants are uprooted. Stumps left behind are often able to throw up shoots and do so with great rapidity under the extremely favourable conditions. The site is generally abandoned after one or two years and quickly becomes overgrown with a dense tangle of tall herbs, shrubs, young trees, shoots from pollarded stumps, and climbers. All successional stages in the development of areas of secondary forest can be traced, and it remains uncertain for how long they can be distinguished from areas of undisturbed primary or primitive forest. They certainly can for very long periods, probably for centuries, and though the differences between secondary and primary forests become more and more blurred with the passing of time, some authorities affirm that the latter never becomes completely re-established.

In the early stages of reversion abandoned sites of cultivation show the following peculiarities:—an abundance of species of herbs,

shrubs, and climbers of a light-demanding nature; density of the undergrowth and of climbers; growth of shoots from stumps; absence of well-developed trees, apart from isolated 'giants' and some trees producing edible fruits; absence of certain species characteristic of neighbouring primary forest; superabundance of certain kinds of plants, such as members of the Acanthus, Ginger, and Grass families (*Acanthaceae*, *Scitamineae*, and *Gramineae*); remnants of plantations such as those of banana and pawpaw (*Carica papaya*). In some areas deserted clearings are quickly overrun by bracken (*Pteridium aquilinum*) or tall grasses (*Imperata cylindrica* and *Andropogon* spp.). Such communities, dominated by one or a few species, are, however, temporary, and invasion by a wide range of shrubs and trees follows quickly in the course of a very few years. Early colonizers are usually those that by quick growth produce an abundance of soft wood; such include the umbrella tree (*Musanga smithii*), which is particularly characteristic of clearings and sometimes forms almost pure communities, the cabbage trees (*Anthocleista nobilis* and *Veronia conferta*), various members of the Spurge family (species of *Macaranga*, *Phyllanthus*, *Ricinodendron*, &c.), legumes (especially *Albizia* spp.), and representatives of many other families. Within a few months areas of abandoned cultivation are covered by an impenetrable thicket which quickly attains a height of 45 to 60 feet. The pioneers are always species needing light, and these are, naturally, such as occur only spasmodically and temporarily in the primitive forest. Under the protection of these pioneer shrubs and trees, seeds germinate, and the seedlings establish themselves, of more shade-loving species, and in time these largely reproduce the normal features of the primary forest. Gradually the herbs and light-requiring species die out. The presence of oil palms (*Elaeis guineensis*) is always suggestive that one is dealing with an area at one time under cultivation.

C. Grass-woodlands

Grass-woodland or tree-savanna is, as the name suggests, a mixture of trees, growing singly or in clumps, with grass and other herbage growing between in continuous or relatively continuous stretches. It covers enormous areas in West Africa, and varies in its composition, in accordance with the varying conditions of those areas. The great belt (or belts) of grass-woodland to the north of the dense forest zone is a climatic formation, corresponding to a lower annual rainfall than that of the mixed deciduous forest and rain-forest belts and to a marked dry season. In some areas its origin is biotic, since it follows



34. Boundary of closed forest and grass woodland



35. Mixed deciduous forest in the Ivory Coast



36. Thornland in Senegal during the dry season, with baobabs and *Borassus* palms



37. Gum acacias (*Acacia senegal*) in Niger

destruction of closed forest, and almost everywhere its features are now controlled very largely by annual firing of the grass and often of brushwood as well. Grass-woodland has been variously subdivided, and a large number of different names (some merely synonymous) have been used by different authors for parts (sometimes called zones, sometimes subzones, sometimes transition areas) of it. Here it is most convenient to deal with the grass-woodland under the headings:

- i. Grass-woodland of the coastal areas.
- ii. Inland grass-woodlands.
 - a. Guinea subzone.
 - b. Sudan subzone.
 - c. Casamancian area.
 - d. Sub-Canarian area.
 - e. Fringing forests.

i. Grass-woodland of the Coastal Areas

Along the gulf of Guinea, as far as south-eastern Sierra Leone, and behind the coastal vegetation proper (mangroves, herbaceous strand community, and coastal scrub), there is a belt of grass-woodland which is partly natural but quite largely due to the action of man. Much of this area is under cultivation. In the eastern Gold Coast, Togo, Dahomey, and western Nigeria this coastal grass-woodland is to all intents a broad wedge, continuous with the northern belt of grass-woodland, but including patches of dense forest. In much of the area of this wedge the climate is not suitable for the development of rain-forest, but is suitable for mixed deciduous forest were it not for man's activities. Both east and west of this wedge rain-forest locally extends practically to the coast, and the assumption is that the belt of grass-woodland and cultivated ground on the seaward side, which is a usual feature, is mainly of artificial origin.

In general, the coastal belt of grass-woodland, where not under actual cultivation, varies from tree-savanna to woodless grass-steppes almost of a semi-desert character. When degradation has not progressed too far, the scattered or clumped trees are similar to those of the rain-forest in the eastern and western parts, and to those of the mixed deciduous forest in the central wedge. The grass growth may be tall and thick, heights of 3 to 4 yards being not uncommon when in full development, and views over the land in plain country are difficult or impossible. Species of *Hyparrhenia* predominate widely, while elephant grass (*Pennisetum purpureum*) occurs in damper

hollows. Before the close of the dry season (especially in Togo and Dahomey) the grass areas are fired by the natives. The annual firing of the grasslands effectively prevents the re-establishment of closed forest, since the trees of both rain-forest and mixed deciduous forest are not such as can withstand fire.

ii. *Inland Grass-woodlands* (Plates 36 to 42)

Apart from two rather specialized areas on the western seaboard, the major zone of grass-woodlands consists of two subzones (considered as zones by some, especially French, botanists): (a) the Guinea subzone of tropical high grass and low tree savanna, and (b) the Sudan subzone of tropical orchard country. It should be noted that some authors have used the name Guinea Zone for the West African rain-forest belt; that is, in a sense quite different from that given to it here. The boundary between the two subzones as here understood is usually between 8° and 9° N. latitude. For what is here considered the major zone numerous more or less synonymous or sometimes more specialized names have been used, such as tree-savanna, parkland, tropical savanna-woodland, bush-forest, and orchard-bush. The characters of the zone as a whole are: mixture of 'grasslands' and trees; the woody plants most often much shorter than in the dense forest; the trees shed their leaves annually and occur in scattered groups or singly; poor in woody undergrowth, woody climbers, and plants growing on trunks and branches (epiphytes); rich in herbs including tall grasses, these typically forming a continuous cover over extensive areas; presence of well-marked fringing forests. These last are such a characteristic and important feature of the zone that they are given separate treatment in the account which follows, since they form marked exceptions to many of the generalizations made regarding the dominant vegetation and flora of the subzones. The zone is far from homogeneous and parts of it are extensively cultivated. In the uncultivated parts the annual firing of the grassland and brushwood has an important selective effect on both the woody and herbaceous species. Only those trees resistant to fire can survive, and these are mostly represented by dwarfed and gnarled specimens. In the herbaceous vegetation there are many grasses with underground stems (rhizomes), which develop new aerial shoots every year. The latter are often close enough together to touch, but are destroyed annually by fire while the underground parts remain intact. The vegetation (excepting the fringing forests) thus shows markedly different successive aspects according to the season.

After the dry-season fires there remain only the trunks of blackened trees, with their bark more or less transformed into charcoal, scattered over an area covered with grey ash from the burnt grass—a monotonous depressing landscape. In March or April the grass shoots suddenly appear above the ground and the blackened trunks begin to bud at the same time. During eight to fifteen days the grass remains short and one has the impression of a rather badly kept park, whence the designation 'parkland'. The herbs develop with remarkable rapidity and occupy all the space between the trees. The summits of the trees, then covered with foliage, only just appear above the tall grasses and other herbs when these are fully grown. The soil is very poor in humus and is often of a fresh red colour. Where hard crusts of laterite occur (sometimes called *bowal*) there may be scarcely any vegetation. The floristic composition, richness, and diversity of the plant life of this zone make it unlikely that the flora is of secondary origin replacing a more ancient flora destroyed by bush fires. These do degrade the vegetation and alter the relative proportion of species present, but it is doubtful if, or how far, they have caused the complete extermination of species and allowed the introduction of others. Among important species of trees widely spread throughout the zone are the shea-butter tree or karité (*Butyrospermum parkii*), the tamarind (*Tamarindus indica*), and the rubber-producing shrub or climber (*Landolphia heudelotii*). The dry-zone mahogany (*Khaya senegalensis*) is an important tree of the savannas, growing up to 90 feet or even more in height.

a. *The Guinea Subzone* forms a belt to the north of the dense forest and, in the Togo-Dahomey region, extends as a wedge to the coast joining up with the coastal savannas. In some parts the annual rainfall and humidity may be as high as in the dense forest region, but there is a well-marked dry season. The grasses, before firing, are extremely tall (heights of from 6 to 18 feet have been quoted) and do not form a closed turf but have distinct bases with the tillers of one plant not growing between those of neighbours to form a continuous mat. Nevertheless the culms are usually close together, and at flowering time a thick high cover is produced which is sufficiently dense to make penetration difficult except along paths. At the earlier periods of growth the grasses provide an abundance of coarse forage. The trees associated with the grasses show marked adaptations to withstanding fires and they also show, individually, the effects of fires, which in this subzone are often started for hunting purposes. Thus a thick development of fire-resistant corky bark and

the ready production of shoots from dormant or adventitious buds are common features. Most of the trees shed their leaves, or these dry up, early in the dry season and renew them at or even a month or two before the return of the rains. Besides species of trees common to this and the next subzone, there are a number whose range centres in the Guinea subzone. These include: the Meni oil tree or false shea (*Lophostoma alata*), the black plum (*Vitex cienkowskii*), and species of *Berlinia*, *Afzelia*, *Terminalia*, &c. The fan palm (*Borassus aethiopum*) and the dum or doum palm (*Hyphaene thebaica*) are also common. The great development of fringing forests is characteristic of this subzone.

b. *The Sudan Subzone* is a belt 120 to 240 miles wide and includes large parts of Senegambia, French Sudan, Niger, and Nigeria. It is variously termed Acacia—tall-grass savanna, tree steppe, orchard steppe, orchard-bush, or brushwood park. Much of the country is densely inhabited, and the natural vegetation has been largely destroyed or highly modified by man. As a consequence secondary communities predominate, and relicts of primitive vegetation are largely limited to rocky uncultivated elevations or to stony hill slopes, or are found along watercourses. Fairly tall grass, 3 to 5 feet in height, with scattered trees, 10 to 50 feet in height, and less development of fringing forests than in the Guinea subzone, are the hall-marks of the Sudan subzone. There is a marked dry season during which the greater number of the trees and shrubs lose all their leaves, whilst the grasses and other herbs dry up and are then very often fired. With the return of the rains, or even sometime before, the new foliage develops, many of the trees and shrubs flower, the ground becomes covered with a green, though sometimes interrupted, sward, and finally numerous annual plants develop. With the trees in full leaf and a green grass cover on the ground the appearance is that of a great orchard or, if the trees be distributed more unevenly, that of an untidy park. The grasses are shorter than in the Guinea subzone and the trees, relative to the grasses, are taller, their crowns being generally far above the tops of even the flowering culms. The grasses are not sufficiently dense in their growth to form a very serious hindrance to human penetration. Species of *Hyparrhenia Heteropogon*, *Andropogon*, and *Themeda* are most important. Over much of the subzone grazing is coarse and poor, especially during the dry season, when herbivorous animals, wild or domesticated, have to rely mainly on grasses growing near the rivers and streams. On the hills and plateaux the flora is of a markedly dry and warm

type (xerothermic) and is much less modified by man than elsewhere. In the more densely peopled localities cultivation and fallow fields may be practically continuous and a great variety of crops is grown.

The most characteristic trees are from 20 to 50 feet high and are usually mixed and sparsely distributed through the grasslands. Groups of trees do occur, but are not numerous. In areas of frequent or continuous cultivation certain useful trees are preserved and form true orchards. Such trees include the shea-butter tree, the African locust bean, and the winter thorn (*Acacia albida*). Trees of the Pea family are amongst the most frequent and include species of *Acacia*, *Albizia*, *Cassia*, *Entada*, and *Prosopis*. Other characteristic tree genera are *Combretum*, *Guiera*, and *Terminalia*. The baobab (*Adansonia digitata*), though not limited to this subzone, is not infrequently a prominent tree, especially in the west. The red-flowered silk-cotton tree (*Bombax buonopozense*) is scattered throughout the Sudanese country.

c. *The Casamancian Area* occupies a belt of varying width (to a maximum of 100 miles) on the western seaboard from southern Sierra Leone to the Gambia. It is essentially a part of the Guinea subzone modified by the coastal climate which allows of considerable development of dense forest in large or small areas. There is abundance of water in the subsoil and often a high precipitation. The often vast stretches of forest, sometimes now much degraded, alternate with bands of vegetation of the general type of the Guinea sub-zone. In the estuaries mangrove-woodland is often well developed. Important forest elements in the area include dry-zone mahogany (*Khaya senegalensis*), the well-known legume *Afzelia africana*, 60 to 90 feet tall, whose black seeds with bright red-orange coloured arils are often used for ornamental purposes, balsam-, or copal-, producing species of *Daniellia* from 60 to 120 feet tall, African teak (*Chlorophora excelsa*) up to 90 feet and more in height, and the bark-cloth tree (*Antiaris africana*), 60 to 90 feet high.

d. *The Sub-Canarian Area*. From Dakar northwards into the southern part of Rio de Oro there is a narrow coastal strip (with a maximum width of about 30 miles, but often narrower) where the humidity of the air and the water resources of the subsoil are greater than in the more typical main west-to-east zones of the Subsaharan and Desert which border it eastwards. As a consequence the vegetation is more southern in character and consists of a mixture of Sudan and even Guinea plants with those found inland at the same latitudes. Thus, even fringing forests and clumps of oil palm

occur near permanent water sources, whilst near at hand are communities of dry-zone plants such as are described below for the thorn-land and desert areas.

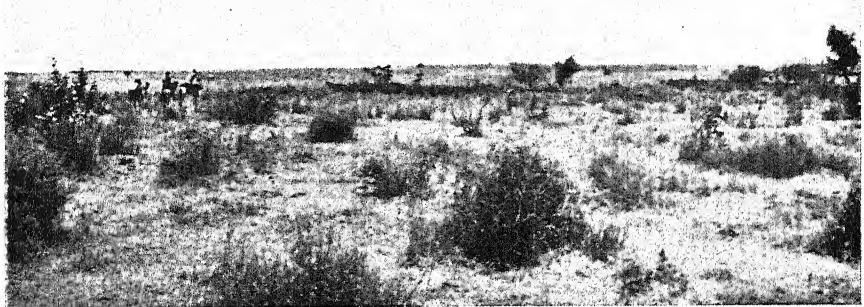
e. *Fringing Forests.* In the grass-woodland zone, and particularly in its southern Guinea subzone of the tropical high grass-low tree savanna, the large majority of the rivers and streams are bordered by belts of high forest. Sometimes the height and density of the constituent trees, the narrowness of the streams, and the nature of the banks allow the canopies to meet overhead, enclosing the stream in a kind of arboreal tunnel. In such cases the term 'gallery forest' may be used, but for general use the term 'fringing forest' is better. The fringing forests, occurring in a zone north of that of the dense forest and therefore with lower annual rainfall and a more marked dry season, depend on a high water-table in the substratum, and one that is continuously renewed, even in the dry season, by seepage from the watercourses. They are, therefore, confined to narrow, though often long and continuous, strips and are usually from 10 to 20 yards wide on each bank. In constitution, appearance, and life-history they are totally different from the grass-woodland which dominates the zone and are closely related to the dense forest. They have, indeed, been described as having the appearance of green tentacles creeping out from the dense forest into the grass-woodland zone. Authorities differ as to whether historically they represent extensions of the dense forest or whether they are remains of one which, formerly, may have covered much or all of the grass-woodland zone. The fact remains that many, or even most, of the tree species of the fringing forests occur also in the dense forest, that many of the trees are of considerable size, that there are many woody climbers, and that the fringing forests as a whole, especially in the Guinea subzone, are evergreen.

D. *Thorn-land*

This zone of thorn bushes and small trees is often referred to in French literature on West Africa as the Sahelian zone, or simply as the Sahel. The vegetation is composed of plants which can survive and reproduce under dry conditions (i.e. of xerophytes). Woody species are not numerous and are mostly low-growing spiny trees, especially species of *Acacia*. In the rainy season numerous herbaceous plants are scattered over the soil but do not form a continuous carpet. Firing of the vegetation is not a great danger and is irregular in this zone, since there is neither the density nor the



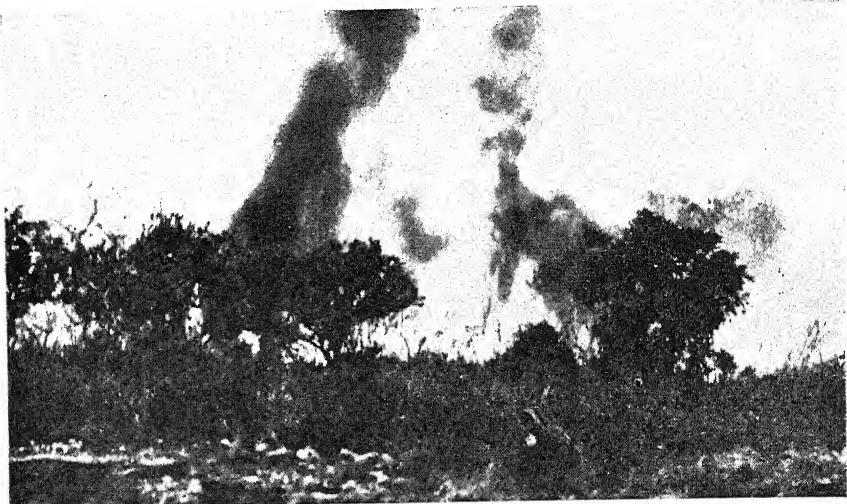
38. Grass woodland: low forest of *Berlinia doka*



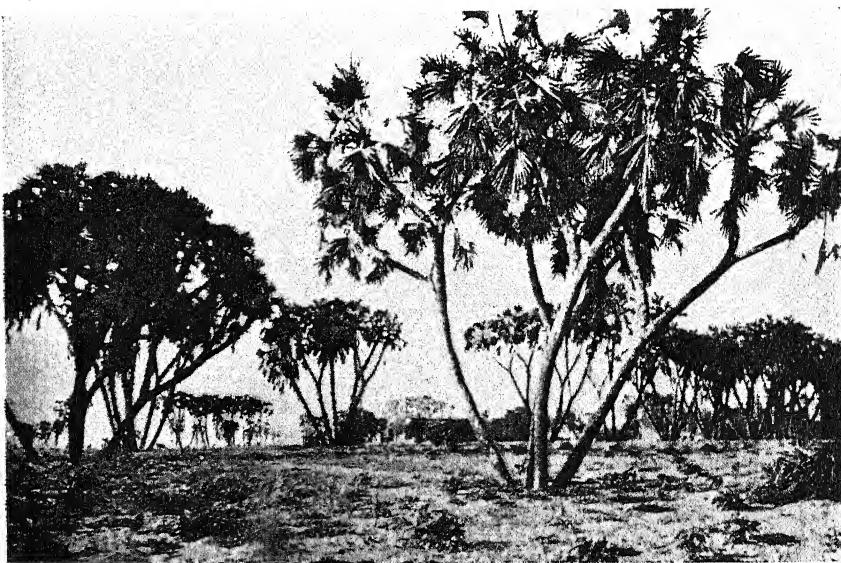
39. Degenerate thornland north of Maradi



40. Grass woodland in Sierra Leone



41. A bush fire



42. Doum palms (*Hyphaene thebaica*) in Niger

continuity of woody or herbaceous growth necessary for extensive fires. Over the area there are large extents of sand and more or less fixed sand-dunes. On the loamy and sandy soils acacias predominate. They occur sometimes as widely spaced or scattered copses or clumps, but sometimes singly and widely spaced. The acacias are easily recognized by their light foliage and paired thorns. There are a considerable number of species, of which four deserve mention. *Acacia seyal* (tamat) is a shrub or small tree, 6 to 12 feet high, very common in the central and western parts of the Sahelian zone and sometimes (as south of Air) forming dense forests. *A. raddiana* (earlier often known as *A. tortilis*) is a fine tree often attaining a height of 45 feet. It is easily recognized by its twisted pods and is probably the most widespread of the Sahelian acacias, which, by the way, are not infrequently referred to as 'mimosas'. *A. senegal* (often known as verek) and *A. laeta*, especially the former, are valuable gum-producing trees of considerable economic importance. A few other characteristic woody plants of the thorn-land may be named. *Commiphora africana* (the African myrrh or 'aderas') is one of the most curious of the Sahelian plants. It is a small tree, seldom exceeding a height of 15 feet, with a short conical stem swollen at the base and divided near the ground into rigid branches spreading in all directions. Short branches are produced as straight rigid thorns. The leaves are composed of three leaflets, are very small, and are shed in October. In November and December the plants are thickly covered with small red flowers. Almost pure stands occur locally in the form of thickets of varying density. *Balanites aegyptiaca*, the soapberry tree or desert date, known in some of the French territories as 'adoua', is a tree 12 to 30 feet high with a thick evergreen crown remarkable for its long green thorns and its small leathery leaves composed of a single pair of leaflets. *Salvadora persica*, the salt bush or 'baboul', is a sprawling shrub forming thickets 6 to 12 feet high and exceedingly bushy. This species is common in some of the northern parts of the zone. *Zizyphus mauritiana*, the jujube tree, is a small tree or shrub rarely attaining 30 feet in height. It has small leaves, white or pale beneath, and strong thorns, which are bent backwards and very pointed. *Leptadenia spartium* is a plant often characteristic of the Sahel landscape and recalling the common broom in its appearance. *Calotropis procera*, the swallow-wort, is a highly poisonous latex-yielding plant much used in native medicine, and with its large opposite leaves, which are not shed seasonally, is of a rather unusual type for the Sahel. The shrubby and somewhat

fleshy spurge *Euphorbia balsamifera* is characteristic of parts of this zone.

The woody plants of the Sahelian country are well adapted to resist both the great dryness of the air during the dry season and the length of this season and to utilize the weak annual precipitation. Not only are many of the trees thorny, but most have very small foliage with the leaves shed for a great part of the dry season. The root system is greatly developed horizontally, permitting the rapid absorption of water from the rare rains before this evaporates. The horizontal development involves relatively wide spacing, though where subterranean water is superficial and abundant the trees close up. There is also considerable downward growth of the roots. One consequence of the great development of the root systems is that the sands, on which the trees often grow, become more and more solidly fixed. Another is that trunks and stools show an unusual vitality even in the young condition, and thus even saplings withstand damage by goats. Natural regeneration is probably largely restricted to years of the most favourable rainfall.

The whole of the Sahelian zone is sprinkled with semi-permanent pools (in Nigeria called 'tapkis') in depressions of clay soil. They often define the filled-up beds of lost rivers. These pools are the watering places for nomads and are usually surrounded by a circle of fine green forest vegetation. Only a few species can adapt themselves to the conditions of inundation, lasting for several months, followed by a prolonged drying up and cracking of the soil. The commonest trees are *Acacia arabica* and *A. nilotica*, but others include *Anogeissus* spp., the African nettle tree (*Celtis integrifolia*), *Mitragyna inermis*, the jujube tree, and the tamarind.

Attempts have been made to distinguish a number of different communities in the vegetation of the thorn-land. While they are often rather ill defined, three may be mentioned as indicating the range of variation within the zone. Thorn-forest consists of thorny trees, mostly acacias, growing sufficiently close together to form a closed or almost closed canopy, and having little grass, weeds, or scrub on the forest floor. This community does not occupy large areas. In addition to the species of *Acacia*, the following may occur in association: *Maerua crassifolia*, the African myrrh, the soapberry tree, and *Boscia senegalensis*. Thorn-savanna is composed of thorny trees of varying espacement, often about 10 feet high, with fairly thick crowns yet forming an open canopy, and with a field layer of some luxuriance. Acacias are again predominant (especially *Acacia*

seyal, *A. arabica*, and *A. raddiana*), accompanied by the soapberry tree, the jujube, *Boscia angustifolia*, *Maerua crassifolia*, and the African myrrh. The thorn-savanna has a wide distribution in the Sahel zone and is particularly important as forming a continuous belt of vegetation south of the desert and even pre-desert region. The grass *Andropogon gayanus* is widely associated with this community. Thorn-scrub is a much more open vegetation than that of the thorn-savanna. The small trees or shrubs range from 5 to 7 feet in height and the grass is tussocky and intermittent. It is extensively developed and forms a rather poor feeding-ground for stock and for camels. In places, especially towards the northern limits of the zone, trees are absent and patches of varying size of pure grass-steppe then occur. The grasses are mostly of a hard wiry type and include species of *Aristida*, *Andropogon*, *Cenchrus*, *Ctenium*, and *Eragrostis*.

E. Subsaharan or Southern Saharan Zone

The thorn-land passes more or less gradually into the Saharan desert, but frequently it is convenient to accept the transition belt, which may be up to 480 miles wide according to some ideas, as a zone distinct from that of the extreme desert. Its boundaries, especially to the north, are much more indefinite than is indicated on most vegetation maps. In the main this zone is desert or semi-desert, except for certain particularly favoured localities (e.g. parts of the Air massif). The mean annual rainfall varies from 4 to 10 inches, and the rains fall every year, but almost exclusively in summer. From July to September much of the soil is covered with annuals and ephemerals (crucifers, grasses, species of *Reseda*, *Cleome*, &c.), while other plants (such as *Fagonia*, *Tribulus*, and *Aristida*) appear in the winter, being then sustained by dew. Various thorny shrubs of the Sahelian zone occur locally and include species of *Acacia*, *Balamites*, *Maerua*, &c., but these lose their leaves during the driest months. There are also some shrubs with persistent leaves (*Salvadora*, *Boscia*, *Calotropis*), and even some perennial climbers with persistent leaves (*Cocculus pendulus*, *Leptadenia lancifolia*). It is interesting to note that the woody species, which become more and more strictly localized northwards, are nearly all of tropical range, while many of the herbs are Mediterranean in distribution or have close affinity with Mediterranean species. The density of the woody species is seldom great and does not necessitate the establishment of well-defined routes of tracks or paths such as are generally necessary in the more southern zones. One can go by the shortest way towards known marks which the vegetation never

hides. The meagre low grasses are not distributed regularly over considerable spaces, as in zones to the south; they grow in tufts separated one from another by bare spaces. Common genera are *Aristida*, *Andropogon*, *Cenchrus*, *Eragrostis*, *Eremopogon*, *Lasiurus*, and *Urochloa*. The surface is largely of sand, often of dunes which occupy extensive areas, or of spaces irregularly covered with pebbles. Towards the north conditions become increasingly arid and plant communities, such as they are, approximate more and more to those of the Sahara.

The Air massif, which falls within the Subsaharan zone, has certain characteristics of plant life unusual for the latitude and no doubt correlated with higher altitude and greater rainfall. The general aspect is wild, arid, and desolate, but in the valleys and on the banks of the 'koris', which overflow after the occasional violent storms, woody vegetation, often extremely fine, is usually developed. This is composed especially of species of *Acacia* (*A. raddiana*, *A. arabica*, *A. laeta*), doum palms, soapberry trees, jujubes, *Maerua*, *Boscia*, *Salvadora*, *Calotropis*, *Grewia*, *Bauhinia*, and *Cadaba*. This woody vegetation is definitely Sahelian, i.e. of a more southern type than that of the surrounding country. The botanical exploration of Air has not yet been completed and there are records, partly unconfirmed and partly obtained from natives, of still more southern (Sudanese) plants. Groves of date palms occur near the few villages.

F. Desert Zone

In spite of the low and exceedingly irregular rainfall there are probably relatively few extensive parts of the Sahara, at any rate within the area covered by this Handbook, entirely and permanently without vegetation. Apart from oases, two main types of vegetation can be distinguished in the desert: firstly, a very scattered permanent vegetation of low scrubby plants, bushes, and, in particularly favourable places, even small trees, and, secondly, an ephemeral covering of herbs. The former is best developed where underground watercourses raise the water-table sufficiently near to the surface to enable the roots of dwarf shrubs, and more rarely low trees, to reach it throughout the dry periods. The latter is a temporary characteristic feature of many Saharan (and Subsaharan) districts and is widely known as 'acheb'. It consists of plants whose seeds germinate immediately after the rains, quickly develop into leaf, and, without pause, pass to the flowering and fruiting condition. The whole life-history is passed through in the course of a few weeks and at its conclusion the entire

plant is scorched up, its seeds distributed, and the remnants of stems and foliage broken and scattered by the wind. After rain the 'acheb' is a gay carpet of coloured flowers; within a few weeks it has entirely disappeared.

The height of the water-table is the most important factor determining the distribution of plants in the desert, and the next most important is the nature of the substratum. Sand is often formed by the wind into dune systems. The sand itself is by no means the most unfavourable substratum for plant growth, but the extreme dryness of the climate in the desert prevents the formation of a fixing sward of vegetation, and the mobility of the dunes, caused by winds, itself hinders the establishment of a plant cover. There is, therefore, a vicious circle (dry windy climate—no vegetation—moving dunes) which cannot be broken artificially (except very locally) as it has been in many coastal dune systems. Actually, where there is sufficient water from telluric (underground) sources a sandy soil often bears a relatively closed and varied vegetation, which may provide valuable grazing. The most barren and monotonous deserts are those with a rocky or stony substratum, and large stretches of these have only an occasional low shrub to represent the permanent vegetation and a very local development of 'acheb' in isolated depressions.

In some parts of the Desert zone there are extensive saline areas which support a relatively rich vegetation of special species (known as halophytes) able to flourish with a high salt-content of the ground water. This halophytic vegetation consists largely of chenopods (i.e. members of the Goose-foot family or *Chenopodiaceae*) and is of considerable importance in forming good permanent forage for sheep, goats, and camels. Special mention should be made of the plant called in Arabic 'had' (*Cornulaca monacantha*). It is widely spread in the central and southern Sahara and its southern limit is said to correspond with the northern limit of the spurge *Euphorbia balsamifera*. It is a low-growing shrub with leaves ending in a spiny point, is a recognized camel food, and is also much used as fuel.

In the ouadis, where there are subterranean watercourses near to the surface, vegetation of a perennial type is dominated by shrubs and small trees which, however, very rarely form a closed community. They afford browsing for camels and may indicate sites for artesian wells. These woody plants are, in our area, mainly thorn-land species which have extended (or maintained) their range through the Subsaharan zone into the Desert zone. They include species of *Acacia*, the soapberry tree, *Boscia senegalensis*, and *Salvadora*

persica. In some ouadis where water is at or very near the surface a growth of reed grass (*Phragmites communis* var.) occurs.

Oases are, in their existing form, and sometimes in their origin, artificial constructions maintained as such by man. Vegetationally the oases are dominated by the date palm (*Phoenix dactylifera*), which is a human introduction. The high water-table assisted by irrigation from wells gives conditions extremely favourable to the date palm, which has been described as a plant flourishing with its feet in water and its head in burning sun. Below the date palms the ground is irrigated, usually in small squares, and wheat, followed by millet, is grown. Very few weeds, and often very few traces of indigenous vegetation, are to be found in the southern desert oases. Poor grazing-grounds are to be found marginal to the palm plantations in some of the larger oases and are composed of wiry grasses, with hard, sharply pointed leaves, and herbs of low nutritive value. Even here the biotic factor has modified the vegetation, palatable species having been killed out, or greatly reduced in number, by wild and domesticated herbivores, only those plants surviving which are protected by their poisonous or unpalatable qualities or by development of a dense mass of hard sharp thorns.

Brief reference must be made to the questions of southern extension of the desert. There appears to be no doubt that in prehistoric times the Sahara had a much greater and more regular rainfall than it has at present and that most of it must then have had a more highly developed and continuous vegetation, though it is probably a gross exaggeration to suggest that it was ever clothed with dense forest. Since the beginning of the Quaternary epoch there has been, on balance, a marked shifting of the vegetation zones southwards in our area. So much is generally agreed, but there is considerable disagreement with regard to what is happening at the present time. Some investigators hold that the southward extension of desert conditions has continued throughout historic times and is, indeed, still continuing owing to a change of climate involving general desiccation. Other investigators hold that there is no valid evidence of long-range climatic changes of this nature within historic times. The evidence is still too incomplete for a final solution of the problem. There is no doubt that locally there has been degradation of vegetation in the Subsaharan and Sahelian zones (and in other zones as well) within recent times, but it is equally certain that this is in large part due to man's abusive exploitation of the natural resources, and especially of the vegetation, by shifting cultivation, fire, and

over-grazing. The unsolved problem is whether man's activities, combined with local topographic changes such as river capture, are sufficient to account for all the observed phenomena or whether continuing secular climatic changes, more serious than short-range fluctuations, are also involved as a subsidiary or even main cause. The pros and cons cannot be discussed here, since they involve a very wide field of which the history of the flora and vegetation is only one part, and also areas far outside those of this Handbook. It may, however, be pointed out that the problem has an important practical aspect. If degradation be due entirely to man's activities, it should be possible to prevent its further extension, and to improve areas already degraded, by enforced legislation and reconstruction. If, on the other hand, progressive deterioration of climate be the main cause of degradation, man can do relatively little even to retard its effects.

FAUNA

FROM a zoological point of view the fauna of West Africa is almost entirely of the composition characteristic of the great 'Ethiopian' region, and the distribution of the various species is closely related to that of the vegetation. Detailed descriptions of all these would fill several volumes; but notes on some of them follow, the main principle of selection having been the extent to which they are interesting, harmful, or useful to human beings.

I. MAMMALS

The Larger Mammals

Lions and Leopards. Lions live in any part of the savanna or semi-desert where there is enough cover and enough game for food. Where rinderpest or other causes have reduced the numbers of wild animals, lions may attack cattle or even men. Man-eaters are not always old and mangy, for young lions in good condition sometimes acquire a taste for human flesh. Leopards frequent the forest as well as the savanna. They are fond of goats and dogs, and hence they often stay near villages. Cheetahs (hunting leopards) (Plate 43) are found across the savanna from Senegal to Air, and caracals, which resemble lynxes, occur in Air. Wild cats are found near Zinder, sand cats in the desert west of Air, and golden cats in and near Sierra Leone.

Elephants. African elephants (Plate 45) are larger than their Indian counterparts, with bigger ears and longer tusks. In West Africa they

are not so numerous as farther east, but they may appear anywhere on the edges of the forest or in the grasslands. At times they are very destructive of crops. Some progress in the taming of these beasts has been made in the Belgian Congo, but nothing of the sort has yet been attempted in French West Africa.

Apes and Monkeys. Gorillas are not found farther west or north than Ikom in south-east Nigeria, but chimpanzees are common in the forests. Baboons, on the other hand, live in more open country. Their chests are deeper and laterally more compressed than those of the chimpanzees, their tails largely atrophied from disuse, their hands blunter and harder from constant contact with the earth, and their noses somewhat elongated and highly sensitive. To supplement their vegetable diet they will sift sand for insects, eggs, and small reptiles. Mandrills live near the coast of the gulf of Guinea. They consort in small troops, are much dreaded by the natives, and have been reported to engage and defeat a leopard. Ordinary monkeys are usually called *Guenons* (a 'frights' or querulous women), a term which includes the Mona and Diana monkeys (Plate 46). The former have iron-grey bodies with vivid chestnut stripes running from the middle of the back to the root of the tail, and white chests and throats; the latter have black, blue, brown, and chestnut upper parts and white chests. Both species normally inhabit forest or thick bush, though some of them are found in open, dry country as far north as the latitude of Timbuktu. Mangabeys, large dark monkeys with white eyelids, are confined to the dense forest.

Guereza monkeys, also confined to the forest, are amongst the most ornate of all. Many of them are brilliantly coloured with long hair giving topknots, moustaches, and other adornments. They live in groups in trees and seldom touch the ground. The beauty of their rich fur caused them to become a prey to the commercial fur hunter. In 1894, for example, over 168,400 of these monkeys were killed, their skins realizing over £41,000. This trade eventually came to an end owing to the scarcity of Guereza monkeys, few of which are now to be seen. Furthermore, districts where these animals were slaughtered have been ravaged by locusts, the monkeys' natural food.

Hippopotami and Rhinoceroses. Hippopotami are found in the larger rivers. Contrary to popular belief, they are not savage animals and will not attack human beings unless provoked. At the same time, it is axiomatic that a wise man will never stand between a hippopotamus and the nearest water. If they come ashore they may do great damage to growing crops. Pygmy hippopotami are limited to

Sierra Leone and Liberia, and rhinoceroses to Northern Nigeria and the vicinity of Lake Chad.

Giraffes. Giraffes, which feed on small leaves, are seldom seen far from Lake Chad. They are much fewer in number and of paler colour than those of East Africa.

Wart-hogs. Giant forest hogs live in the dense forests of the Ivory Coast and Liberia. Wart-hogs proper are abundant in Senegal, and are common in central French Guinea, central Ivory Coast, and northern Dahomey. They have very large heads with big tusks. Red river-hogs with white manes make their homes in the banks of forest rivers.

Buffaloes. There are two types of buffalo in French West Africa, the large black buffalo of the savanna and the smaller red variety of the forests.

Barbary Sheep. Barbary sheep, loosely called *Mouflons* by the French, occur in Air and in the extreme north-east of the Federation.

Hyenas. Both spotted and striped hyenas are found in open country. They may be troublesome in attacking sick persons or in stealing leather articles from camps.

Foxes and Jackals. Foxes are represented by the sand foxes of Senegambia and by the small desert foxes (*fennecs*), with large ears, of the north. Hunting-dogs, blotched black and yellow, come from northern Dahomey. Jackals are few.

Manatees. Manatees (sea-cows) are the size of small seals. Their fore limbs are flippers, and they have no hind limbs; instead, they have tails like those of whales. Manatees are herbivorous and live in large rivers.

Game Animals

West Africa has no enormous herds of game such as roan, or used to roam, the grasslands of the east and south of the continent. Nevertheless, many species of deer-like beasts exist, although there are no zebras.

Duikers. The word *duiker* is Afrikaans for 'diver', and refers to the animal's habit of leaping high out of long grass and then plunging into it head first. A herd of duikers so engaged suggests a school of porpoises at play. Yellow-backed duikers (bush goats) are the largest of these rather small animals. These, together with bay and bush duikers, live in the bush; whereas the black duikers of French Guinea and the blue duikers live in the forest. Duikers often raid crops.

Hartebeestes, klipspringers, oribis, water-bucks, kobs, reed-bucks,

gazelles, oryxes, addaxes, roan antelopes, bush-bucks, and, largest of all, elands (Plate 44) range over the savanna and semi-desert lands. Marsh-bucks, royal antelopes (only 10 inches high), and bongos live in the forests. The last-named are bright glossy red, with white chevrons on their faces and white stripes on their flanks.

The Smaller Mammals

Civets and Mongooses. Civets are cat-like animals, about the size of spaniels, with grey, black, or spotted fur. Genets are similar to civets but of slighter build. They live in the forest and feed largely upon birds. There are several species of mongoose, particularly marsh-mongooses with their cross-striped backs. They are killers and eaters of snakes.

Rodents. Hares live in the poorer grasslands of Senegambia, squirrels in the more open sections of the forest, and dormice, rats, and

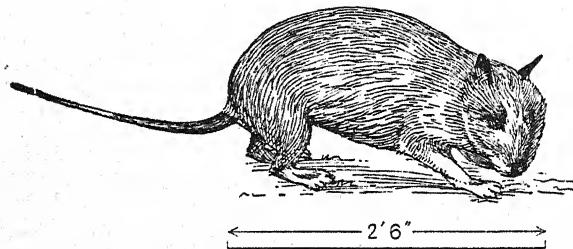
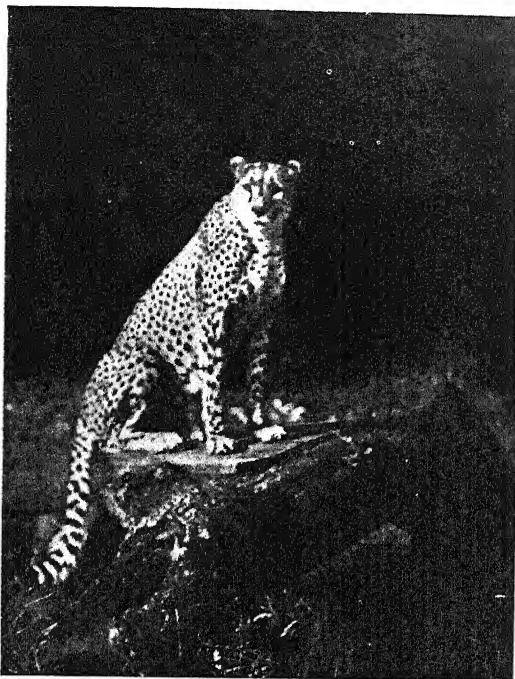


FIG. 39. *The Giant-rat*

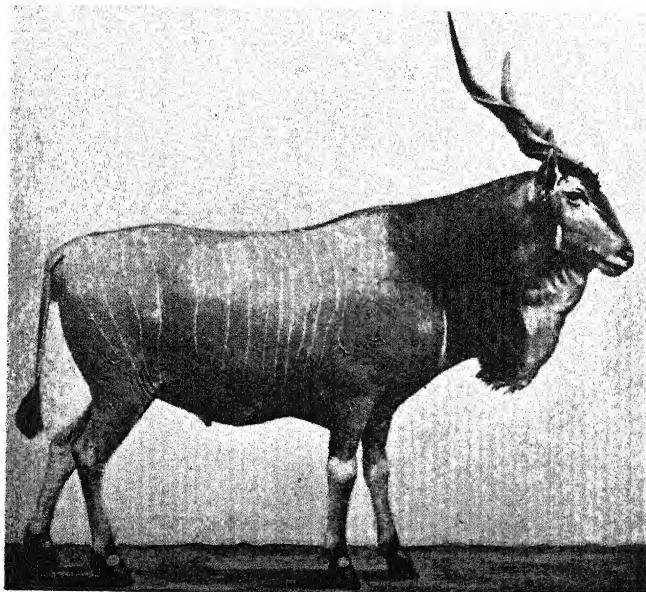
mice almost everywhere. Jerboas are found in the desert. Giant-rats (Fig. 39) measure up to 2 ft. 6 in. in total length, and the large cane-rat, tailless and nearly as big as a beaver, is widely spread. Its flesh is a great native delicacy. Porcupines are not uncommon in Air.

Water Chevrotains. Water chevrotains (Plate 47) are somewhat remarkable animals of the coastal districts. Their feet are at a stage intermediate between the four toes of pigs and the two toes of antelopes. Their colouring, rich brown with lighter spots and stripes, is highly protective amid the varying lights and shadows of their environment.

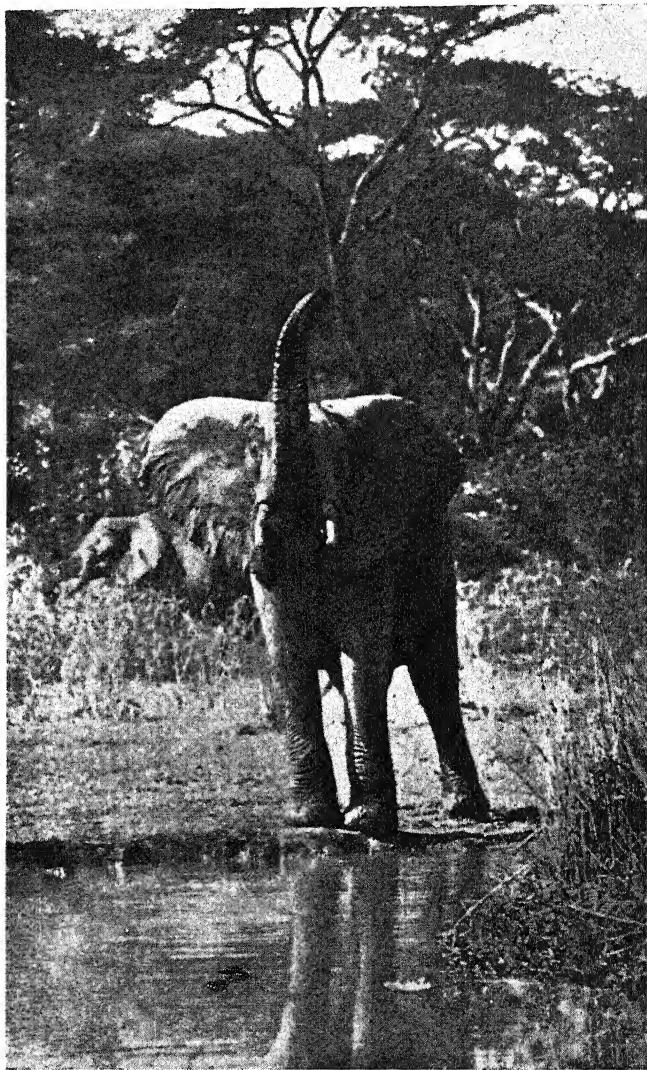
Aardvarks. Aardvarks (Plate 48), sometimes known by the misleading name of 'ant-bears', are the most primitive of African mammals. They are large-eared, long-snouted, heavy-bodied, long-tailed, and almost hairless. They live in burrows and feed on termites.



43. *Cheetah*



44. *Eland*



45. *Elephant*

Moles and Hedgehogs. No true moles are found; but golden moles, which have similar habits, exist in open or arid country. They have iridescent hairs mingled with dense softer fur. Hedgehogs, with long and spiny tails, occur in Senegal and in southern Niger.

Other animals worthy of mention are bats, flying foxes, shrew-mice, otters, and conies. These last have two species: one, that lives in trees, with a penetrating scream; the other, less noisy, that makes a home in the rocks of the Sahara.

II. BIRDS

Birds of Prey

There are few true eagles in this part of Africa. Crowned hawk-eagles feed on monkeys and on other small animals, tawny eagles occur in Senegal and in Bornu, and there are smaller eagles in other parts of the savanna. Vultures are common and perform a valuable sanitary function by eating decaying flesh. The largest vultures are Rüppell's griffons, which are almost black in colour save for dark brown backs. Black kites are other useful scavengers, and buzzards kill snakes.

Water Birds

Fishing eagles and ospreys kill and eat fish. Long-tailed small cormorants are found by most rivers, and pelicans by the Senegal and Lake Chad. The latter are clumsy birds when on the ground, and their nests emit an unpleasant stench, but in flight they are graceful. Spoonbills, herons, and egrets occur almost everywhere. Tiger-bitterns make loud cries at night from the rivers of the forest. Storks are numerous, especially a type with a white neck and black breast and wings. There are many ducks, the best known being the white-faced tree ducks (whistling teal) (Fig. 4o), which nest in trees near swamps and lagoons, and brown ducks. Black-and-white spur-wing geese are frequently seen, as also are Egyptian geese, moorhens, and stone curlews. White-headed plovers inhabit the sandbanks of coastal rivers from Liberia eastwards, but spur-wing plovers, with their black, white, and brown colouring, are common on the shores of swamps and lakes farther north. Egyptian plovers are said to enter the mouths of resting crocodiles. Terns frequent the estuaries and lower reaches of large rivers, and gulls Lake Chad. There are several species of kingfisher, notably the Malachite kingfisher, which

has a black and blue barred crest, blue back, red bill, and reddish underparts.

Forest Birds

The forests contain many birds, most of which are brightly coloured. Such is their number and variety, however, that mention

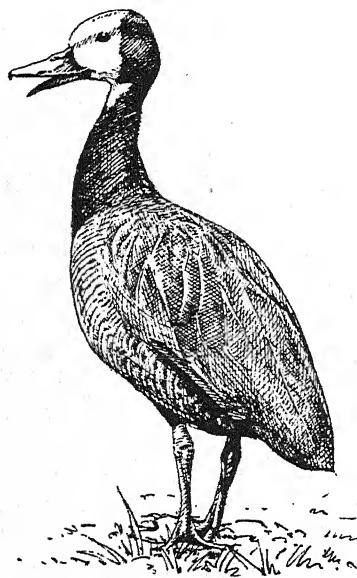


FIG. 40. *The White-faced Tree Duck*



FIG. 41. *The Honey-guide*

will only be made of those likely to be least unfamiliar to English readers.

Speckled pigeons, large maroon and grey birds with forked neck-feathers, are particularly addicted to *Borassus* palms. Grey pigeons, wood-owls, and crakes are typical of the densest rain-forest. Turacos (plantain-eaters) are noisy and sociable. They are soon noticed as they leap from bough to bough, cackling in an unmistakable manner. The largest of them are deep blue, others purple or green. Colies (mouse-birds) are peculiar to Africa. They are about the size of sparrows, cling to branches with their feet drawn up in front of their bellies, and creep about like mice. Hornbills, ugly black and white birds with enormous bills, have a particularly raucous cry. Honey-guides (Fig. 41) have earned their name because their conspicuous

flutterings indicate the proximity of bees' nests. Woodpeckers are green with brown heads. Ant-thrushes prey upon ants. They have scarlet bellies and green and blue upper parts. Bulbuls are birds of thrush-like appearance and green and yellow in colour. The call of one of the commonest species sounds not unlike the words 'Quick, doctor, quick!' Weaver-birds are likely to attract the traveller's attention, as they build enormous communal nests and chatter loudly the whole day long. Song-thrushes, golden orioles, and sunbirds are all numerous. The last-named thrust their long slender bills into flowers in order to extract honey.

Birds of the Savanna and of the Desert

Ostriches occur in Senegal and in the belt of desert separating Northern Nigeria from Aïr. Marabouts, with their repulsive bald heads and necks, are useful scavengers. Tall secretary birds, with their bunches of long feathers above the ears, stalk about the open plains of the upper Gambia and the middle Niger and prey on snakes.

Crowned cranes have highly ornamental grey, brown, and black plumage, yellow crests, and pink and white cheeks. They frequent open country near water and congregate in parties to perform regular dances. Their booming cries before rain and their sonorous call-notes are familiar sounds. One species of the huge Sudan bustard is found in French Sudan and in Niger and another species in the Ivory Coast. Rock-pigeons occur in Aïr, but the most numerous of this genus are the speckled pigeons noted above. These birds do much damage to grain crops. Turtle-doves likewise are fond of grain and of ground-nuts. There is a local species of the well-known grey parrot in French Guinea, Liberia, and the Ivory Coast. This is of rather a dark grey with the tail dark red and the upper mandible of the bill red. Parakeets are widely spread in open country and are harmful to ground-nut crops.

Owls are numerous and include barn-owls and the white-faced owls of rather dry regions. The African yellow-billed cuckoos closely resemble the common European variety. Red-breasted cuckoos announce the coming of rain by calls of three descending notes. Coucals (bush pheasants) skulk in bushes or fly heavily across open spaces. One type has two names: 'bottle-bird' from its bubbling call and 'fool-bird' from its stupid behaviour. Bee-eaters are found in thorn-scrub. They are entirely green in colour save for black bands through the eyes and across the chest. Among the many species of larks the clapping larks attract attention in open plains by beating

their wings together; they are often so high in the air as to be invisible. Black wheat-ears with white rumps are not uncommon in Air. Swallows differ from the English species by having throats never darker than pale buff. Helmet shrikes (Fig. 42) have powerful hooked beaks and stiff feathers in the forehead curving forward to hide the nostrils. They frequently perch in exposed positions and swoop down upon their insect prey. Green and yellow wild canaries live everywhere north of the forest. Tiny rose-red fire-finches are common in flocks about the villages; they feed on grass-seeds. Ox-peckers, dark-brown clumsy birds with yellow red-tipped bills, clamber about grazing cattle or antelopes. Pied crows, a glossy purplish-black in colour with wide white bands, are also found near human habitations.

Game Birds. There are several types of francolin (bush fowl), the largest being the size of a grouse. Quails, guinea-fowl, stone partridges, snipe, sand plovers, and sand grouse are also represented. All these may be shot 'for the pot'; and, for a European, skill with a gun may bridge the gap between a meagre diet and a full one.

Other tolerably familiar birds are grebes, wood ibises, nightjars, swifts, hoopoes, wagtails, and magpies.

III. REPTILES AND AMPHIBIA

Crocodiles

Crocodiles are not so dangerous as is popularly believed, and there are few authentic instances of men having been killed by them. The largest species, so characteristic of the Nile, seldom exceeds 16 feet in length, and is not common in West Africa. Most of the local crocodiles are not more than 12 feet long and feed exclusively on fish.

Tortoises and Lizards

Tortoises. Many tortoises are found, some being unique in having the rear parts of their upper shells hinged so as to close down. These creatures make their homes both in the forest and in the savanna. Fresh-water tortoises and soft-shelled turtles are also common.

Lizards. Geckos are nocturnal tree-lizards, furnished with pads that enable them to cling to branches and to run upside down along them. The commonest lizards are the Agamas: their heads vary in colour from rust brown to scarlet, their bodies from grey to bright blue, and their tails from grey to dull red. Monitors are useful beasts



FIG. 42. *The Helmet Shrike*

in that they eat the eggs of crocodiles. Chameleons are confined to the forests of the Ivory Coast.

Snakes

The following paragraphs can do no more than attempt to assist in the distinction of dangerous from harmless species. In this connexion head markings are of rather more importance than is colouring. Poisonous snakes need not be unduly feared by the booted European, and most of them will glide away from his path if they can. The silent-footed native, however, may come upon a resting snake so quietly that it has no time to escape, but strikes in self-defence.

Poisonous Snakes. The most deadly snakes in this part of Africa are the mambas. Fortunately, the notorious black mamba of South Africa is not found north of the Congo, but the green species is almost as dangerous. The poison fangs are farther forward than in any other kind of snake, being right under the nose. There is also a fang in the lower jaw. The head is elongated, very distinct from the neck, and brown with a black edge. The body is usually olive-green, but it is sometimes grass green; the latter leads to confusion with the tree snake. The actual pursuit and attack of human beings by mambas is largely limited to breeding-grounds during the mating season.

Vipers can be identified by the great width of the back of the head, which gives it something of the shape of an ace of clubs. Their large fangs lie horizontally along the jaw until the mouth is opened to strike and the fangs are erected. The most widespread species is nocturnal in habits; it is about 3 feet long, olive or brown in colour, and it has a dark inverted V on the back of the head.

Puff adders have bloated bodies and stubby tails. They are apparently sluggish, not moving out of a man's way, but inflating themselves and hissing. Yet they strike with lightning rapidity. The forest puff adder is 6 feet long and with a colouring which blends perfectly with its variegated background, the savanna type is reddish-brown or yellow and some 5 feet in length. Tree-vipers are usually little more than 2 feet long and dark green in colour.

Cobras have short, rigid, and permanently erect poison fangs in front of the jaws and are well known for their expansive hoods. Black-tipped cobras live in rocky places by forest rivers and reach lengths of 8 feet. Their scales are jet-black, like polished glass, and the shields bordering their lips are rimmed heavily with black. Their throats are light yellow and their bellies are deep yellow gradually darkening into black. Spitting cobras eject streams of venom for

several feet into the eyes of those who disturb them. Smaller than the black-lipped variety, they are blue-black with red or yellow patches under their hoods, and live in grassy lands.

Boomslangs are only mildly poisonous. Some of their posterior teeth are enlarged and grooved to conduct venom. These teeth can only be engaged if the snake grips and then advances its jaws in the chewing motion used in swallowing its prey. This bulldog grip is very different from the swift stroke of other snakes.

Pythons. Forest pythons are 20 feet or more in length with bodies of various colours. The tops of their heads have single dark brown blotches bordered by light stripes from the nostrils to above the eyes. Savanna pythons have similar heads except for the light stripes, but they are only 5 feet long and have chocolate and yellow bodies. These snakes are not poisonous, but crush their prey by coiling themselves round it.

Other Snakes. Colubrines often live in the thatch of native huts. They are dull brown or olive in colour and up to 4 feet long. Another species, with longitudinal stripes of vermillion, lives in the forests. Wolf snakes, so called because of their long teeth, are found in the savanna. File snakes are known to prey on other snakes. Tree snakes are extremely numerous, and, as has been said, their colouring resembles that of a mamba. Water snakes may reach a length of 6 feet. Sharp-nosed snakes, with their down-turned snouts, are very brightly coloured. Their bodies are pale brown tinged with pink and with scales so closely fitting as to give the effect of enamel. Grass snakes and sand snakes occur whenever suitable surroundings are present. The latter are common near villages and are liable to startle the traveller by suddenly darting across his path.

Amphibia

Tongueless frogs live in the forest, and clawed toads in the forest or in more open country. These are completely aquatic, their homes sometimes being quite small water-holes. Toads proper may be seen in all parts of West Africa, as may tree frogs and water frogs. One species of river-frog feeds on smaller frogs and young crabs.

IV. FISH

The following fresh-water fish are sufficiently well known to be popularly recognized.

Tiger-fish. Tiger-fish have formidable teeth and feed on other fish. They are sometimes called 'water leopards' and may reach 100 lb.

in weight. They give good sport, but their flesh is more relished by natives than by Europeans.

Barbel. These provide excellent eating. One species is caught in traps at rapids, another by hooks at the edges of rivers.

Electric-fishes. Electric-fishes are stumpy and thick with short rounded tails, small fins, and thick and blubber-like skins. They produce shocks which can be felt through a thick leather sole.

Perches. Nile perches are found in the Senegal and the Niger, and specimens weighing 200 lb. have been landed. The so-called climbing perches move across land when the pools in which they live dry up. They are able to do this because of the spines on their gill covers. Accounts of their tree-climbing habits, however, are probably due to birds capturing them when they are travelling.

Globe-fish. Globe-fish (or puffers) (Plate 49) are remarkable for their power of inflating themselves into globular shape. Their skins are sometimes used by natives for polishing wood.

V. INVERTEBRATES

Crabs

Fresh-water crabs are very numerous. During dry periods they may be found in underground burrows away from water. When caught they are sold for food in native markets.

Scorpions and Spiders

Scorpions. Some of the largest known scorpions live in West Africa, some in the forests and others in drier parts. They are easily identified by their large pincers and their long upturned tails, which carry the stings.

Spiders. The largest spiders live in burrows, each with a sort of trap-door. The giant web-spinners are common in the forests, and their webs, several feet in diameter, are strong enough to hold small birds.

Insects

Insects enormously outnumber all the other kinds of living creatures, and tropical Africa is exceedingly rich in them. Many of them are harmful or irritating to human beings, but others are useful and even beautiful.

Tsetse-Flies and Mosquitoes. Full accounts of the varieties and the habits of tsetse-flies and of mosquitoes will be found on pp. 136-7 and pp. 126-7 respectively.

Termites. Termites, commonly miscalled white ants, are related to cockroaches and not to ordinary ants. Notorious for their destructive habits, they either build nests in the branches of trees or make burrows underground. In the latter case, there may be either immense termitaria ('ant-hills') or merely holes in the ground leading to subterranean colonies. During the rains swarms of termites may emerge from their holes and discard their wings. In this state they afford food to every kind of predatory animal, including man himself.

Driver Ants. Driver ants are true ants, reddish-brown in colour, and with considerable biting powers. Vast hordes of them, composed of individuals of very different sizes, will drive away or destroy every living thing they meet. When they go through a house in this manner they will clear out every rat, snake, and insect. They march in close columns, but they need not be feared if left alone.

Butterflies. There is an enormous variety of butterflies in West Africa, among the commonest being those belonging to the *Acraea* family. Its members, not found outside Africa, are tawny red, bright red, or yellow with black markings.

Bees. Wild honey-bees are well known to the forest tribes, for whom honey is an acceptable article of diet. Sweat-bees in search of moisture crawl over the faces and hands of travellers during the dry season. They tickle intolerably, and, if crushed, leave an unpleasant smell.

Cockroaches, locusts, beetles, moths, ants, and wasps are all well represented, together with bugs, gnats, and flies in great variety.

Government Regulations

Game Reserves. A decree of 13 October 1936 provided for the establishment of national parks and of game reserves. It does not appear that any of the former have been created, but the latter exist along the upper Gambia, between the Volta and the Comoé, on the upper Sankarani, in the extreme west of the Ivory Coast, between the Tapoa and the Alibori, in the Kaarta district, on the upper Tinkisso, in western Mauritania, and in southern Dahomey.

Protection and Licences. The same decree also listed animals wholly or partly protected from hunting or capture, and provided for three different types of hunting licence. The *Permis sportif ordinaire* cost 100 francs, the *Permis spécial de moyenne chasse* 500 francs, and the *Permis spécial de grande chasse* 1,500 francs, each with a deposit of an equal amount. In addition there was a poll-tax payable for each head of certain animals shot. Other licences were required from the individual colonial governments.

Hunting. The semi-darkness of the dense forest defeats the white man's skill, and only natives can hunt in it. The savanna, however, imposes no such limitation. Game is most abundant near water. The upper rivers of Senegal, especially the Falémé, the middle of the Ivory Coast, and central Dahomey are all well stocked. Other areas suited to the chase are the centre of the Niger basin and between the Niger and the Senegal. Savanna lands, generally speaking, have much bird life, while swamps and lakes provide water-fowl. Fish can be had in great abundance, but the numerous insects seriously disturb the fisherman's comfort.

CHAPTER V

HEALTH

General

A CHAPTER devoted to the health problems of tropical African countries must of necessity consist largely of information concerning the more important communicable diseases gleaned from reports either from the administration or of special investigations and inquiries. Basic statistical data concerning births, deaths, infant mortality rates, and the causes of morbidity and death, on which alone a just appraisal of the health conditions of any community can be formed, are altogether wanting in French West Africa, outside a very few large centres of population. The total population figures are only approximate. Information of value may be obtained from a study of the diseases for which patients seek relief in hospitals and dispensaries: such institutions are few, however, in relation to the size of these territories, much of which is still difficult of access. In certain outlying districts it might be possible for serious epidemics to run their course unobserved and unrecorded by health authorities. It should be noted, too, that increased attendance at dispensaries does not necessarily indicate increased prevalence of disease; it is sometimes only a welcome indication of increased confidence in the efficacy of treatment there obtainable. Moreover, the relative frequency of different diseases in the diagnosis registers of dispensaries may be a misleading indication of their relative frequency among the populations served. A gelong familiarity with certain diseases has led them to be regarded as inevitable complications of existence from which relief would rarely be sought. Finally, there are certain diseases cases of which the natives are sometimes at pains to conceal.

Rather more valuable information is obtained by itinerant dispensaries or other medical survey units. For years past these have displayed great activity in French West Africa, carrying out sleeping-sickness surveys and treating sufferers from that disease. Year after year a large proportion of the populations of infected areas is inspected by these travelling units and the progress of the disease is closely watched. At the same time information concerning the prevalence of other diseases is obtained.

In this chapter it is possible to do little more than catalogue the more important endemic diseases, to describe the nature and the

geographical distribution of some of them, and, in some cases, to discuss the factors responsible for excessive prevalence or rarity, as the case may be. It is realized that such a recital may give a very imperfect and possibly misleading picture of the health conditions prevailing in these vast territories. The list of diseases is long and includes some of the most dreaded scourges of humanity. Parasites and microbes are more abundant and varied than in most parts of the world. In spite of this, man can survive long years of exposure to them all, with little or no detriment to health, if advantage be taken of the safeguards that modern research has made available. Most of the diseases are communicable and preventable, but their adequate control necessitates a degree of enlightenment of backward populations, and improved standards of life, that can hardly be anticipated in any near future. Viewed thus, some of the health problems of West Africa may seem hopeless of solution. If so, a study of the past medical history of the coast will act as a corrective to despair. If one recall the dread in which the west coast of Africa was held not so very long ago, and its synonym the 'white man's grave', which was apt enough even up to the end of last century, and if one contrast the conditions then prevailing with things as they are to-day, with special reference to the expectation of life and the preservation of health of the white resident, despair is changed into amazement at the transformation that has been effected in so short a time. Nowhere else in the world have the benefits conferred by the results of research into tropical diseases been more strikingly exemplified than in parts of West Africa. The discovery that mosquitoes, rather than 'insalubrity of climate', were chiefly responsible for the appalling morbidity and mortality rates of European settlers pointed the way to salvation. The benefits conferred on native races by increased and increasing knowledge of tropical disease have been substantial though less dramatic than in the case of European residents; they are much more difficult to measure. It must be remembered that the natives were never in a plight comparable to that of the European pioneers who ventured to these shores; they had, through agelong contact with devastating diseases, notably malaria, developed an immunity which enabled them to survive, if not to flourish, in conditions which proved rapidly fatal to the unprotected invader.

The opening up of these countries by European enterprise has not been all gain for the indigenous populations. There are very important entries on both the profit and loss sides of the account. Internecine wars and slave raids are things of the past; agriculture has been

developed and food resources have been increased; medical assistance provided by governmental, missionary, and other agencies has relieved an untold amount of suffering and misery. But with these and other blessings of civilization the white man has introduced new infections, and new strains of infection, to which the indigenous population has fallen a ready prey. Both tuberculosis and syphilis have almost certainly been much more prevalent and deadly than before the coming of the white man. Kroobois on the coast engage themselves on ships and, in France or England, contract tuberculosis, and disseminate the infection on their return. French Senegalese and other soldiers have similarly spread infections contracted abroad.

The opening up of a country, the construction of roads and railways, postulate much increased facilities for the spread of infection. In olden days the distance between villages and differences of tribal customs combined to constitute a form of sanitary cordon which has almost completely disappeared. Porterage and labour forces engaged on constructional work or on plantations or in mines have facilitated the interchange of infections. Improving communications make possible a corresponding increase in the range of public health activity, but they add very greatly to the work public health services are called upon to do.

Had this chapter been written forty years ago a good deal of sickness would have been ascribed to insalubrity of climate. Much might have been said about acclimatization. Meteorological conditions in West Africa are fully described elsewhere. The relatively scant references to them in this chapter must not be taken to imply that they are of but little interest to the epidemiologist. The exact contrary is the case, but apart from the baneful effect of exposure of the human body to extremes of temperature, the role of meteorological conditions in the causation of disease is mainly indirect. Temperature and humidity are important factors in determining the geographical distribution of the insect vectors of human infectious diseases of many kinds; they determine the duration of the cycle of development of certain human parasites undergone in the insect's body; they influence the capacity of survival displayed by disease germs outside the human host. It is of course true that prolonged residence in hot, humid climates may sap the energy and resistance to many forms of infection of the European; it may be harmful to mind and body alike. But the amenities that are now available in the larger centres, appropriately constructed, properly sited and mosquito-proofed dwellings, electric fans and light, the frigidaire, and the motor-car, can

rob an unpleasant tropical climate of nearly all the terrors it once possessed for the European.

The total population of French West Africa is believed to approximate $15\frac{3}{4}$ millions, a small population for territory covering 1,844,828 square miles, little more than 8 persons per square mile. A large portion of the territory is, however, desert. Questions of population have been dealt with elsewhere. The information contained in Chapter VII, pp. 238-45 may help the reader to appreciate the significance of some of the figures contained in this chapter.

Malaria

Malaria is the most widespread of all diseases throughout West Africa and, directly or indirectly, is probably the most important cause of morbidity, inefficiency, and premature death. It complicates the clinical picture of many other pathological conditions. To the white man and to other non-immune sojourners in these territories malaria represents the chief threat to health and life. By undermining health malaria renders its victims more susceptible to other infections.

Malaria is caused by the invasion of the body by a minute unicellular animal parasite, certain developmental forms of which, including male and female adult forms, circulate in the peripheral blood. *Anopheles* mosquitoes transfer the parasite from man to man. The female parasite is fertilized in the stomach of the mosquito and the resultant progeny finds its way to the mosquito's salivary glands; this process takes about a week, the exact time being dependent upon temperature and other factors. The mosquito is then infective to the next susceptible human it may bite. After the infective bite a period of some ten days may elapse before the onset of fever.

The mosquito that is responsible for carrying the majority of malaria infections in West Africa is *Anopheles gambiae*. It is probably the most efficient vector of malaria in the world. It has a very wide range of distribution in Africa, but until recently it was confined to that continent. Recently it was exported to Brazil, where it has gained a foothold, and very strenuous efforts are being made to stem its advance. *A. gambiae* is not fastidious as to the water on which it deposits its eggs; for this reason it is difficult to control. It breeds in small puddles common in the rainy season, in pools left in river-beds in the dry season, and in any collection of water exposed to the sun. Its larvae can flourish in fresh water or in water containing up to 66 per cent. salt water.

Though *A. gambiae* is the most important vector throughout West Africa, other species are of importance, though not so universal. *A. funestus* is a potent carrier; it appears to be rare in coastal districts, but not uncommon inland. It is a small dark mosquito, often found in dwellings and breeding near the overgrown banks of slow-flowing streams and rivers as well as in marshes, pools, and ditches. Other species that have been recorded include *A. marshalli*, *A. pharoensis*, *A. mauritanicus*, and *A. squamosus*.

Measures of malaria control aimed at the elimination of mosquito breeding-places, or at the destruction of the aquatic stages of the developing insect, measures which have achieved striking success in other parts of the world, have a limited field of application in West Africa outside the large towns. There are some authorities who decry any attempt at anopheline control on a large scale in the hyperendemic malaria conditions prevailing in most of West Africa: they maintain that repeated infection is necessary to maintain the high degree of resistance enjoyed by the native population. If that were reduced, epidemic malaria might result. Other means must be sought to protect the susceptible stranger.

It is no exaggeration to affirm that, except for a few areas in the north, every member of the indigenous population of French West Africa is infected with malaria very early in life. Among those who survive the perils of infancy, signs of universal malaria infection are found in children up to 8 years of age. Thereafter infestation rates begin to decline, and before adolescence most natives have acquired a state of resistance to malaria which, reinforced by repeated reinfection, lasts throughout life. This is Nature's way of rendering human life possible in hyperendemic malaria countries, an expensive way, for those who fall by the way are very numerous, and the survivors are bereft of much of the stamina and efficiency that they might have possessed in malaria-free surroundings. It must be confessed, however, that malaria infection does not appear to be incompatible with apparent good health in these highly immune populations; children harbouring malaria parasites may have a healthy appearance.

All four types of the malaria parasite, *Plasmodium falciparum*, *P. vivax*, *P. malariae*, and *P. ovale*, are found in West Africa. *P. falciparum*, the cause of subtertian, or malignant tertian, fever, the most virulent of the four, is by far the most prevalent and is responsible for upwards of 80 per cent. of all cases.

In Dakar, hospitals and dispensaries treat very large numbers of cases of malaria: 1935, 11,669; 1936, 12,915; 1937, 26,868. The

increase was partly explained by a growing popularity of dispensaries. Anti-mosquito measures are effective in the European town, and but few infections are contracted there. Of 248 Europeans admitted to hospital for malaria in 1937 six died; of 262 natives admitted, 29 died. Blood examinations showed that of 2,455 patients 86 per cent. were infected with *P. falciparum*; *P. vivax* and *P. malariae* were each responsible for 6 per cent. of infections. The maximum incidence of malaria is from September to January, the last three months of the rainy season and the beginning of the dry season: this holds for Senegal as a whole.

In Senegal there were 42,643 patients with malaria treated in 1936 and 39,305 in 1937, figures which represent about 40 per cent. of all dispensary attendances. The percentage of children with enlarged spleens is 40 to 50 in nearly all parts of Senegal; in Sine-Saloum the spleen rate is as high as 75 to 80 per cent.

In Mauritania malaria is responsible for more than a third of the sickness for which patients seek relief in dispensaries and from doctors on tour: there were 10,035 such cases in 1936, and 9,562 in 1937. The spleen rates of children in the Kaédi and Kiffa areas, near the Senegal river, were 47·3 and 45·8 per cent. At Atar in central Mauritania 650 children were examined; none had an enlarged spleen, a rather surprising circumstance. It would be hard to find other places in French West Africa with no evidence of endemic malaria.

In French Sudan 12,528 patients suffering from malaria were treated in 1937. Here again the season of maximum incidence is at the end of the rains, October to January. The spleen rates of children, from early infancy to 6 years, are high; at later ages high rates are rare. In villages in irrigated lands nearly all infections are with *P. falciparum*.

In Niger malaria occupies third place in the order of frequency of diseases from which sufferers seek relief; 10,785 cases were treated in 1937. The incidence is fairly constant during the first six months of the year: in July there is usually a marked increase and the maximum incidence occurs in September. In the thorn-land zone the spleen rate of infants under 2 years of age varies from 37 to 44 per cent.; for children 2 to 10 years of age the rate is generally above 40.

In French Guinea 38,603 cases of malaria were treated in 1937, 7·6 per cent. of all causes of sickness for which relief was sought. Children are universally infected. Nearly all infections are with *P. falciparum*.

In Dahomey 48,745 natives and 163 Europeans were treated for



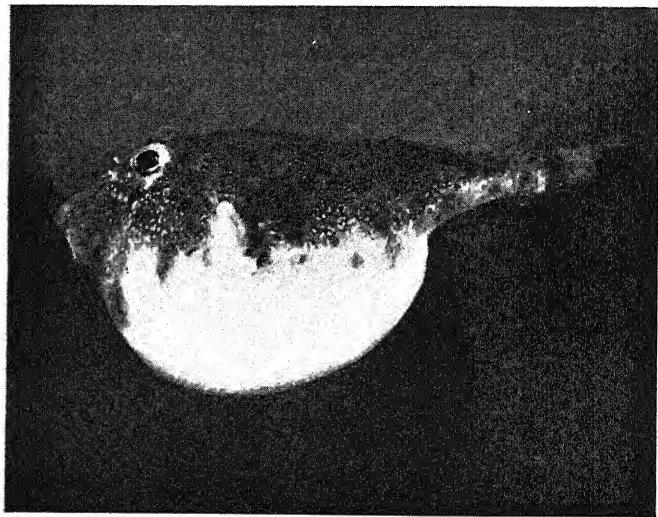
46. *Diana Monkey*



47. *Water Chevrotain*



48. *Aard-vark*



49. *Globe-fish*

malaria in 1937: 121 natives were admitted to hospital, of whom 23 died, 13 with pernicious symptoms.

In the Ivory Coast consultations totalled 33,444 in 1936, 36,079 in 1937.

Togo suffers very severely from malaria. Of the 80,618 patients treated for this disease in 1937, 25,874 were under 2 years of age. At Sokode, where sanitary work has made some headway, the following spleen rates were recorded: ages 0-2, 47; ages 2-5, 26; ages 5-10, 10; ages 10-15, 4 per cent. In regions in which there are no dispensaries spleen rates at ages 2-5 averaged 52; at ages 5-10, 25. In Togo also *P. falciparum* infections were much the most numerous.

Cases of blackwater fever were recorded from all the colonies except Mauritania: Dakar 13 cases (7 Europeans), 5 deaths; Senegal 20 cases (3 Europeans); Sudan 6 cases, 2 deaths, all European; Niger 1 case; Ivory Coast 18 cases (11 European); Dahomey 12 cases (1 European); Guinea 22 cases (10 European, 4 fatal; 10 Syrians, 2 fatal); Togo 25 cases (2 European).

In existing social and economic conditions but little can be done to protect the great bulk of the African population from infection with malaria. It should be possible to provide sufficient quinine or other antimalarial drug to help infants and children tide over acute attacks until they have acquired the resistance to malaria which repeated infections confer, and to treat acute cases in adults. In adult natives the acute attack often runs a mild course and terminates naturally without the administration of quinine. The presence of malaria parasites in adult natives often complicates diagnosis; it is not necessarily an indication that they are suffering from malaria. It is reported that 48·6 per cent. of adults in Southern Nigeria have malaria parasites in their blood. Fever in such people may be caused by tuberculosis or many another infection. If one's experience was confined solely to malaria among the native African population one might arrive at the conclusion that the disease is a mild one. The experience of Europeans in West Africa, however, affords sad and abundant evidence of how severe and deadly a disease malaria may be. The protection of the European population is therefore a vital task.

In ports and large towns anopheline control, and in Africa mosquito control in general, is the most important task for the health service of the town. Draining, grading, filling, and the treatment of all permanent breeding-places with oil, or other larvicide, need constant attention. Inspection must be systematic. The importance

of a piped and constant water supply; obviating the necessity for water storage in houses, is further stressed in the section dealing with yellow fever. In town planning it is well to arrange for the European residential area to be placed well away from the native quarters of the city. Servants' quarters should not be in close proximity to the European's residence. These precautions are important from the point of view of malaria as well as many other diseases. Mosquito-proofing of doors and windows, if properly executed and intelligently used, affords great protection. Failing this, the conscientious use of mosquito curtains is essential. The destruction of adult mosquitoes in houses by hand-spraying with Flit or other similar insecticide is a very useful ancillary measure of malaria control.

Most European residents in West Africa rely on the regular ingestion of antimalaria drugs to protect them from malaria. In British colonies, in which malaria conditions closely resemble those obtaining in many parts of French West Africa, 5 grains of quinine a day are taken by the majority of British residents. Prophylactic quinine does not prevent malaria infection, but it may keep the infection latent and prevent attacks of fever. Experience has shown, however, that a daily dose of 5 grains of quinine is not sufficient to protect a man exposed to the stress and strain of war, or of hard manual work, from clinical attacks of malaria in hyperendemic countries such as these. The dose should be increased to 10 grains a day in such conditions; the majority of men tolerate such a dose. Atebrin, or its English equivalent mepacrine, is possibly of higher value as a clinical prophylactic. Till recently there has been a tendency to over-emphasize the toxicity of atebrin. It was generally insisted that atebrin should not be used except under medical supervision. Recent army experience has shown that 0.1 gm. of atebrin a day can be given over prolonged periods without harmful effect of any kind save a temporary yellow tinting of the skin, a matter of small importance to troops on active service. A daily dose of 0.06 gm. of atebrin was used in the present war by the German army in its Balkan campaign. Now that the world's chief source of quinine, Java, is in enemy hands, the possession of an equally, if not more, efficient synthetic substitute is an asset of prime importance.

Yellow Fever

Yellow fever is an acute specific infectious disease caused by an ultramicroscopic virus which is conveyed from man to man by a mosquito, *Aëdes aegypti*. In 1937, 48 cases with 44 deaths were

reported from the colonies of French West Africa: 29 cases with 27 deaths in Senegal, 3 cases and 3 deaths in French Sudan, 7 cases and 5 deaths in the Ivory Coast, and one fatal case in Dahomey. These figures are small, representing a negligible proportion of the total morbidity and mortality of these territories. In spite of this, yellow

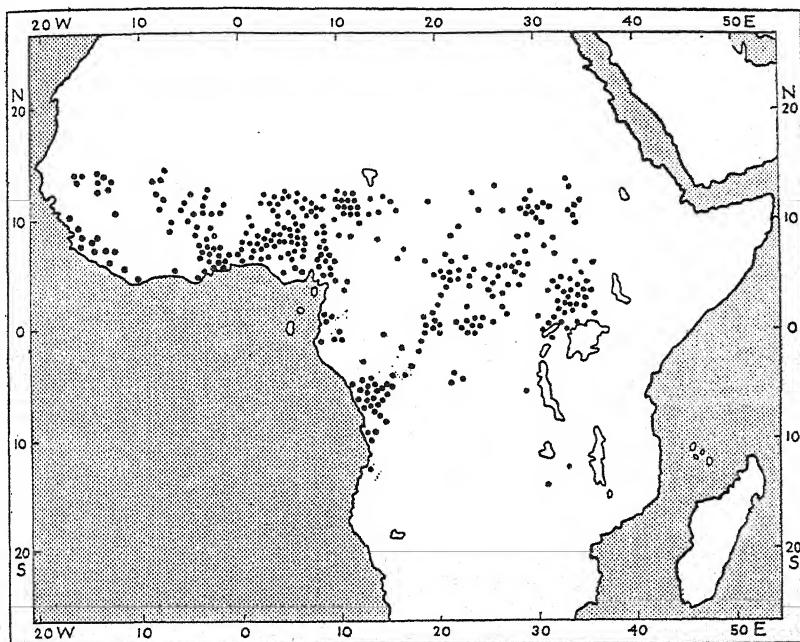


FIG. 43. *Areas in which Positive Results have been obtained with Tests for Immunity to Yellow Fever*

fever is second to none in importance among the endemic diseases of tropical Africa; it is a constant menace.

Recent research has made enormous contributions to our knowledge of this disease and has defined the important gaps in our knowledge which still remain.

An attack of yellow fever confers immunity. Mouse protection tests have been devised whereby immune substances in the blood of persons who have suffered from yellow fever may be detected. Widespread immunity surveys have been carried out. The age of immune persons may give indications of the time that has elapsed since the last epidemic of yellow fever in the locality concerned. By such means it has been shown that yellow fever extends over a much

wider area of tropical Africa than was recently believed. The two maps that are reproduced are from a paper by Findlay on the present position of yellow fever in Africa (*Transactions of the Royal Society of Tropical Medicine*, 1941, vol. xxxv, p. 51). Figure 43 shows the areas in which positive results with yellow-fever immunity tests have been obtained; Figure 44 shows the areas in which yellow-

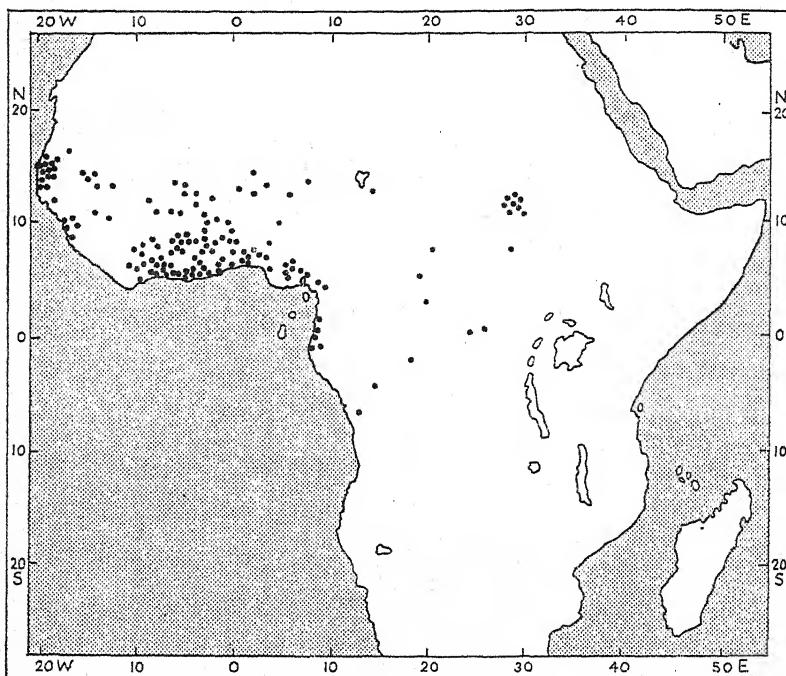


FIG. 44. *Areas in which Yellow-fever Cases have been recorded, 1921-1941*

fever cases have been recorded between 1921 and 1941. The maps show that the yellow-fever endemic area extends from the south of the Sahara to the Belgian Congo and from the coast of Senegal to the Anglo-Egyptian Sudan and the western shore of Lake Victoria. The whole of French West Africa south of the Sahara is in this zone. The value of the immunity test received striking confirmation in 1940. A considerable proportion of the natives in the Nuba mountains, Anglo-Egyptian Sudan, had given positive reactions, though there was no history of any epidemic clinically resembling yellow fever in that area. Towards the end of the rainy season of 1940 an epidemic

of yellow fever broke out; 15,267 cases and 1,577 deaths were recorded. Beeuwkes and Mahafy (1934) showed that there are numerous localities in West Africa south of the Sahara in which a large proportion, up to 92 per cent. of the population, gave positive immunity tests, but in which yellow fever has never been recorded. It would seem that yellow fever in natives is difficult to diagnose clinically.

In West Africa isolated cases of yellow fever, unconnected with any epidemic manifestation of the disease, are of frequent occurrence; some of these are difficult to explain. It is possible that the virus may be carried on by a mosquito-animal cycle, but nothing positive is known. Immune substances have been found, however, in 19·5 per cent. of 123 monkeys and apes caught in yellow-fever endemic areas. No such immune bodies have been found in the blood of monkeys from India and East Africa, where yellow fever has never occurred. Virucidal bodies have also been found in the blood of domestic animals in yellow-fever endemic areas, for example, in sheep in Northern Nigeria; they have also been found in domestic animals in places free from yellow fever, though in less amount. An infected mosquito remains infected for life, but even in favourable conditions the average life of an *A. aegypti* probably does not exceed two months. In some areas in which yellow fever seems to be endemic there is a prolonged dry season during which mosquitoes are difficult or impossible to find. Is there hereditary transmission of the virus through the mosquito egg? This may be possible, though not apparently with *A. aegypti*. Other species of mosquito are capable of transmitting the disease in the laboratory, though none have as yet been incriminated as doing so in natural conditions in Africa. In Brazil three other species of mosquito, captured in the forest during an epidemic, were found harbouring yellow-fever virus: two of these species can transmit the disease. Finally, there are several instances of research workers, who had not been immunized, acquiring infection by other means than by mosquito bite while working in the laboratory with yellow-fever virus. Such are some of the important unsolved problems of the epidemiology of yellow fever.

All these questions are of special interest and importance at the present time because of the opportunities for the spread of infection afforded by the ever-increasing development of rapid means of communication, by air and road, from and through yellow-fever endemic areas. The geographical distribution of yellow fever is at

present very limited when compared with the distribution of *A. aegypti*. This mosquito is very prevalent in East and South Africa and enormously prevalent in India, as in many parts of the Far East, in all of which yellow fever is unknown. Strains of *A. aegypti* from these areas are capable of transmitting the virus of yellow fever.

After the bite of an infected mosquito the incubation period of the disease is from two to six days. During the later part of the incubation period and the first three days of fever the patient may be infective to mosquitoes. It is generally difficult, sometimes impossible, to make a definite diagnosis of yellow fever from clinical signs alone. It may be confused with other forms of jaundice, relapsing fever, malaria, hepatitis, necrosis of the liver, influenza, and other conditions. The resources of a well-equipped laboratory are often necessary for a certain diagnosis. In these circumstances, when one considers the difficulties of communication in many parts of West Africa, the distances involved, and the extent of territory without adequate medical supervision, one is forced to wonder what relationship the few cases of yellow fever reported in West Africa bear to the total number of cases that actually occur.

There is now a safe and effective method of immunizing people against yellow-fever infection, with a living attenuated virus: the vaccine must be kept continuously at or below freezing-point.

There was no case of yellow fever reported in the Dakar district either in 1936 or 1937, and only one in 1938. Efforts are made to eliminate the breeding of *A. aegypti*. The inspections of buildings during 1937 numbered 414,778; 250 breeding-places were discovered, mostly receptacles containing rain-water, but 25 were holes in trees.

The 30 cases reported from Senegal in 1937 concerned 9 Europeans, 18 Syrians, and 3 natives. Cases occurred in all months of the year except in January, June, and July. The infected localities were Rufisque, Thiès, and Gossas in Sine-Saloum. In August 1942 a confirmed case was reported from Kédougou and one confirmed and three suspected cases from M'Bour. Records of epidemics of yellow fever of varying degrees of severity in Senegal have been frequent during the past 150 years. Between epidemics the disease lay dormant for periods varying from 7 to 37 years.

In French Sudan there were 5 cases of yellow fever reported in 1936, 3 in 1937, and 4 in 1938. Of the 1937 cases one was that of a European in Toukoto; the other two, Syrian women living in the same house in San. In 1938 there were 3 jungle cases: cases such as

these indicate the possibility of some unidentified animal reservoir of infection. Two suspected cases were reported from Koulikoro and Bafoulabé respectively, in September 1942.

The 7 cases in the Ivory Coast in 1917, 6 European and 1 native, were reported from 3 foci of infection, a plantation at Adzopé, Agboville 30 miles away, and Gaoua in the north. In 1938, 15 cases and 14 deaths were ascribed to yellow fever. The last two confirmed cases were reported from Bobo Dioulasso in August 1942.

In Dahomey the one fatal European case recorded in 1937 was from the Abomey subdivision. There were 4 fatal cases in 1936, and 1 in 1938. A suspected case was reported from Abomey in August 1942.

No case was reported from Niger or French Guinea either in 1937 or 1938. No case ever appears to have been reported from Mauritania. In Togo the last case of yellow fever reported was in 1935.

A very considerable amount of immunization has been done during recent years with a vaccine prepared in the Dakar Pasteur Institute. Between 1934 and 1937 inclusive, 10,412 yellow-fever immunizations have been done in French possessions in Africa. During this period 109 fatal cases of yellow fever have been recorded, all unvaccinated persons save one, who had been immunized two years before the fatal attack. A method of mixed vaccination against small-pox and yellow fever has been evolved in Dakar. Favourable reports of its use have been published, but the method is not approved by some most competent to express an opinion.

Pending further information as to the existence of jungle yellow fever in West Africa, measures of prevention must in large measure consist in the control of the ubiquitous *Aëdes aegypti* in towns or other large centres of population. The favourite breeding-places of this domesticated species of mosquito are water-containers in and around houses, tins, flower-vases, gutters, gourds, crocks, in fact anything that retains water. Hollows in trees retaining water afford facilities for breeding, as may banana trees. A continuous piped water-supply, which obviates the necessity for storing water in houses, might make the virtual eradication of this species of mosquito possible in many places where at present it constitutes a plague. Immunization should be compulsory for all European or other susceptible visitors to, and sojourners in, yellow-fever endemic areas. The principle of residential areas reserved for European accommodation in such areas should be universally adopted. In the case of yellow

fever such segregation might not be so essential if all Europeans were immunized, but its value is not limited to protection from that disease. Segregation much diminishes the risk of infection with malaria and other diseases. Mosquito-proofing of houses and mosquito-nets are, of course, desirable, but it must be remembered that *Aëdes aegypti* attacks by day as well as by night.

The international Sanitary Convention for Aerial Navigation of 1933 lays down the organization necessary, and the measures to be taken, in aerodromes situated in regions in which yellow fever is present.

Dengue

Aëdes aegypti, the most important mosquito vector of yellow fever, is also the transmitting agent of dengue, a specific febrile disease of short duration characterized by severe articular and muscular pains and a well-marked skin eruption. It is very rarely fatal, but the victim may be incapacitated for two weeks or longer. Epidemics on a large scale sometimes occur. New arrivals in endemic areas are specially prone to attack. Dengue may occur in all the French West African colonies. Reported cases mostly refer to Europeans: the disease in the native may be more difficult to diagnose. Cases recorded in 1937 were: Senegal 4; French Sudan (Bamako and Ségou) 32; French Guinea 13; and Ivory Coast 20.

Sleeping-sickness (Trypanosomiasis)

Sleeping-sickness is a disease caused by a microscopic parasite called a trypanosome. The genus *Trypanosoma* comprises many species parasitic in many different vertebrate hosts, from reptiles to man. The trypanosomes are conveyed from host to host by means of biting-insects. Some of these trypanosomes are conveyed from animal to animal and from man to man by tsetse-flies, *Glossinae*; they are in fact dependent on tsetse for their survival. These are the only species that need concern us here. Of them three are of outstanding importance in different parts of tropical Africa, *Trypanosoma brucei*, *T. gambiense*, and *T. rhodesiense*. All of these were primarily parasites of the antelope and other 'big game'. These three species are morphologically indistinguishable, but they differ physiologically. *T. brucei* is unable to infect man; *T. gambiense* and *T. rhodesiense* can. Of these two *T. gambiense* has probably had a much longer association with man; it is now a true human parasite. Fortunately it is much more susceptible to treatment with arsenic than the other forms.

In French West Africa it is *T. gambiense* that is responsible for most, if not all, of the sleeping-sickness. Infection is conveyed from man to man by the tsetses *Glossina palpalis* and *Glossina tachinoides*. A tsetse-fly may convey infection by two methods. By interrupting its meal on an individual whose blood harbours trypanosomes, and passing on immediately to bite another victim, infected blood on the tsetse's proboscis may infect the latter. This is probably a very unusual method of transmission and is only likely to be operative when trypanosomes are unusually numerous in the peripheral blood. The indirect, or cyclical, method of transmission is more usual and much more important. In this the trypanosomes undergo a cycle of development in the alimentary canal of the fly, and after an interval of from 10 to 25 days small forms of the trypanosome (metacyclic forms) find their way to the salivary glands of the fly. These are the infective forms. Until the glands are infected the fly is incapable of transmitting the disease. After the glands are infected the fly is dangerous to every susceptible individual it may bite.

The geographical distribution of sleeping-sickness is dependent on the distribution of tsetse-flies. These require heat and moisture. In French West Africa *Glossina palpalis* flourishes, wherever conditions are favourable, south of 10° N. latitude. *Glossina tachinoides*, another vector, extends about 4° farther north. No sleeping-sickness has been reported north of 15° N. and very little north of 14° N. All *Glossinae* are dependent on humidity and thus on vegetation sufficiently thick to protect them from the sun's rays. *G. palpalis* is confined to dense vegetation in the immediate neighbourhood of water and does not range far: it passes its life in more or less dense forest bordering rivers, watercourses, or other collections of water. *G. tachinoides* requires similar conditions for breeding, but is less dependent on moisture and may seek its victims farther afield in less shaded areas.

In Senegal sleeping-sickness is limited to the southern half of the territory, where its distribution is limited to certain well-defined areas and appears to be diminishing. New cases discovered in 1937 numbered 187, as compared with 277 in 1936 and 271 in 1935. Of the 187 cases in 1937, 96 were in Casamance, 27 in Sine-Saloum, and 58 were from Rufisque. The Dakar health authorities discovered 45 cases; these were all imported cases, mostly from Rufisque. Rufisque is the most northerly district of West Africa from which sleeping-sickness is reported. In January 1938 there were 753 known cases of sleeping-sickness alive in Senegal.

In French Guinea there are two known important centres of

infection: (1) Labé and the adjacent canton Kankalabé in the Mamou district, in Fouta Jalon, and (2) the forested region south and west of Kissidougou. Outside these two areas cases were found in 1937 in the Kolenté region, where tsetses are numerous, and in the Koumbia region; these districts require further attention. At the end of 1936 there was a very active focus of sleeping-sickness near the Ivory Coast and Liberian frontiers in the Beyla and N'Zérékoré provinces. During 1937 two survey units, each headed by a European doctor, worked throughout the year, one in Fouta Jalon, the other in the Kissidougou area. The survey unit was followed by a treatment unit, in each case. The Kissidougou unit examined 87,705 persons; it found that the cantons immediately surrounding Kissidougou were almost free from infection, but farther west, at the beginning of the Mafinlia valley, in the Yombiro canton, several villages had indices of new infections of 2·8 per cent. and total morbidity of 8 per cent. In the Bamba canton, following the river, the indices increased to new infections 6·4 and total morbidity 12·7 per cent. The whole of the Guékédou province was contaminated. The whole of this area was unobserved from 1934 to 1936, a fact which partly explains the high new infection rates.

The Fouta Jalon unit examined 93,024 persons in a large and densely populated area. In Labé province, including the adjacent Kankalabé canton, the morbidity rate, new infection rate, and the circulating virus rate were 5·14, 1·77, and 1·79 per cent. respectively. The three chief foci of infection were the southern part of Labé province with the Dalaba subdivision of the Mamou province; the Mali subdivision of the Yambering canton in the north of Guinea; and the north part of the Djimma canton and the south part of Oredimma.

In French Sudan, sleeping-sickness occurs in a wide band of the southern territories extending from Ouahigouya to the Senegal frontier where this is formed by the Falémé river. The most important endemic area extends along the course of the Bani river and its tributaries Banifing, Bagoe, Baoulé, Bafing, and numerous *marigots*. These marigots only form dangerous foci for tsetses during the rainy season, June to December. Many of the villages are well away from these rivers, but in seed-time and harvest the villagers spend all day on the fertile lands along their banks, which abound with tsetses. *Glossina tachinoides* is more in evidence than *G. palpalis*; *G. morsitans* also occurs. Less important foci of infection are found among populations living (*a*) near the Black Volta river, (*b*) south of Bamako along the tributaries of the Niger and along the Niger itself as it leaves French Guinea,

and (c) along the river Senegal and its tributaries, Baoulé, Bafing, and Falémé. No prophylactic work has been done in the Senegal basin. Persons harbouring trypanosomes have been found at Kita. Certain areas on the right bank of the Falémé, in the Bafoulabé province, have been abandoned by the natives; these call for investigation. There are big game and many *Glossinae* in this area. On the road from Bafoulabé to Satadougou in the month of June a *G. tachinoides* was caught with trypanosomes in the salivary glands. In 1939 a second investigation unit was to have been formed to look after the basins of the Senegal and Niger, leaving the unit which had done good work since 1934 to concentrate all its attention on the Bani and Black Volta valleys. During 1937 and 1938 it had found 1,569 patients harbouring trypanosomes. In the Bamako subdivision the high proportion of cases found with trypanosomes in blood and lymph glands indicated the existence of an epidemic in full activity. Throughout the area a very large proportion of cases had signs of involvement of the central nervous system. In the past treatment has been little more than prophylactic, enough to rid the patient's blood of trypanosomes but not enough to effect a cure. A great extension of curative treatment was planned for 1939. Treatment centres were created at Tougan, Nouna, San, Ségou, Sikasso, Bamako, and Dioïla. There was no European doctor in the Koutiala sector.

In Niger the little sleeping-sickness that there is appears to be confined to the extreme south. During 1937 the Say subdivision, on the Niger just north of Dahomey, was re-surveyed and the Diapaga subdivision to the south-west of Say was surveyed for the first time. In the Say subdivision 9,189 persons were examined, including 334 old cases; 22 new cases were discovered. In the Diapaga subdivision 43 cases were found among 33,684 persons examined. All infected persons were sent to the treatment centre at Say. Most of the new cases were said to be from among natives who had returned from either Togo, the Ivory Coast, or Nigeria. At the end of 1937 there were records of 850 trypanosomiasis cases alive in the whole colony. Tsetses caught in cages were *G. tachinoides*. The survey unit included the prevalence of malaria, tuberculosis, and leprosy in its survey and carried out numerous vaccinations.

In the Ivory Coast, in 1937, 11 field units examined 399,203 natives, of whom 12,122 were old cases. Of these old cases 4,074 were still infected, a high figure. New cases numbered 13,809, 3·53 per cent. At the end of 1937 there were 69,263 known trypanosomiasis cases in the upper Ivory Coast and 10,761 in the lower Ivory Coast.

The annual report states that more work is required in this colony to reveal the full extent of sleeping-sickness prevalence and to combat its ravages. In the north of the country the most heavily infected provinces are those of Ouagadougou, Koudougou, Bobo Dioulasso, and Gaoua on the White, Red, and Black Volta rivers. The centre of the southern heavily infected area is the province of Man; infection extends northwards to Touba and Odienné, eastwards to Daloa, Bouafle, Zuenoula, and Issia, and southward to Gagnoa, Divo, and Sassandra.

In Dahomey in 1937 methodical search for trypanosomiasis cases was carried out in the Djougou subdivision of the Parakou province, and in the Natitingou province, the two known centres of the disease. Natives inspected numbered 72,926, amongst whom were 3,431 old patients; 42 of these still harboured parasites. There were 1,046 new cases discovered. Thus 1·5 per cent. of the population harboured trypanosomes. On the whole the disease appeared to be stationary or diminishing in intensity except in the cantons of Tanekakaka, Dompago, and Taneka-Koko of the Djougou subdivision. In Natitingou the Birni and Yetapo cantons want watching, as does the Kangnangou canton on the Togo frontier. It is noteworthy that 27·6 per cent. of the old cases and 70·7 per cent. of the new cases in Natitingou showed pathological changes in the cerebrospinal fluid, as compared with 24·0 and 33·4 per cent. respectively in Djougou. This is an indication that inspections have not been frequent enough in Natitingou. The Djougou natives are said to be more assiduous in undergoing treatment. In Djougou considerable stretches of the banks of the Binah river have been cleared of scrub and the disease appears to be well controlled, on the whole.

In Togo there are active foci of trypanosomiasis in the northern half of the country. The number of new cases discovered fluctuates within wide limits year by year. To what extent these fluctuations reflect actual changes in epidemic virulence is hard to estimate. New cases recorded were: 1933, 4,367; 1934, 3,754; 1935, 12,001; 1936, 15,234; 1937, 2,070. In 1937, 91,816 natives were examined by survey units, amongst whom 1,883 new cases were discovered. A further 187 cases were seen by the sanitary formation of Pagouda. Of the 12,178 old patients seen 785 still harboured trypanosomes. The circulating virus index was thus about 3 per cent. Lama is about the centre of the worst-infected area. The banks of the Binah, Kara, Pahelou, and Poundja with their tributary streams offer favourable conditions for tsetses. In some cantons the infection rates were very high. In the North Binah canton trypanosomes were found in 1,005

of 6,012 natives examined, 16·7 per cent.; here women were more affected than men and children, agricultural work exposing them to infection all the year round. In the Pessaré canton there are numerous watercourses flowing east to the Binah and west to the Pahelou; in 4 villages 4,313 natives were examined; 318 harboured trypanosomes, 7·3 per cent. In the Siou canton 296 were infected, 9·1 per cent. In certain areas remarkable falls in prevalence were noted. Thus in the Koumea canton the circulating virus index of 15,471 inhabitants was 0·7 per cent., as compared with 18·6 in 1935. Similarly in Niamtougou, a densely populated canton on a plateau on which numerous rivers rise, the banks of which are infested with tsetses, rates had fallen from 22 per cent. in 1935 to 0·19 in 1937. No explanation of these dramatic improvements is forthcoming.

The above is sufficient to give an idea as to the extent of sleeping-sickness infection in French West African territory, but little or no indication of the mortality it causes. In a recently published paper Varcel stated that in the French Cameroons, where sleeping-sickness prevails in conditions not unlike those in parts of French West Africa, the annual mortality of sleeping-sickness patients discovered and treated varied from 5 to 15 per cent.: for untreated cases the annual mortality rate varied from 25 to 50 per cent.

In general it may be said that the disease is well controlled and stationary, if not in regression, in Senegal, Niger, and Dahomey. In the Ivory Coast much remains to be done. In French Guinea and Sudan there are still some suspected areas that had not been surveyed when the last available reports were written. Tribute must be paid to a large amount of work done in difficult conditions.

Most of the effort has been directed to the search for cases and the administration of sufficient medication to free the blood-stream of sufferers from trypanosomes. In some of the colonies more prolonged treatment would doubtless have resulted in a much greater number of cures. Too many of the sufferers are seen for the first time at a relatively late stage of the disease.

In essence the eradication of sleeping-sickness is a question of breaking contact between tsetse and man. The diffuse distribution of tsetse along countless rivers and streams, and the large number of people affected, make this a counsel impossible of attainment except on a very limited scale. Fishing, river transport, and the gathering of forest products are occupations which entail risk of attack by tsetses. In certain areas the most fertile land lies near streams, the banks of which are infested with tsetse. A good deal can be, and has been, done

by clearing scrub and bush, and lopping the lower branches of trees, for 200 yards or so on either side of fords, bridges, or places used for washing or obtaining water. Similar clearings of tsetse breeding-grounds around villages are practicable. The value of such village clearings has been demonstrated in the Gold Coast and elsewhere by the decreasing prevalence of sleeping-sickness among the females of such villages. Camps in a tsetse country should, of course, be sited well away from a watercourse and in open country if possible.

Severely endemic sleeping-sickness is generally associated with great poverty, insufficient food, poor physique, very low standards of living, and very feeble resistance to disease of many kinds. Improvement of the natives' standards of living may contribute markedly to a decreased prevalence of the disease.

In its early stages trypanosomiasis is a curable disease. Modern drugs have robbed the disease of many of the terrors it once possessed. Of the modern drugs Bayer 205 is said to have prophylactic value.

Plague

Plague has not spared French West Africa, but it has loosened its grip during the past few years and does not constitute a serious threat to the public health at the present time. Plague is a disease of rats caused by a bacillus which is transmitted from rat to rat and from rat to man by a rat flea. Pneumonic plague, the most dread form of the disease in which infection is conveyed direct from man to man, sometimes in terrifying epidemic form, has not been, and will not be, experienced in West Africa, except in small isolated groups of cases. *Rattus rattus* and its congener *R. alexandrinus*, a white- or grey-bellied *R. rattus*, are the most important disseminators of plague by virtue of the much closer association they establish with man than do other rat species. They are domestic rats and have almost a world-wide distribution. They appear to be common in all West African coastal towns. *Xenopsylla cheopis* is the most effective flea transmitter of plague; it is much the most prevalent of the rat fleas in West African ports. In some parts of the world plague infection is kept alive and disseminated by wild rodents, over vast stretches of country. Here the danger to man is confined to trappers and others who come into close contact with these wild rodents, or where the wild rodent comes into contact with domestic species. As far as is known this *selvatic plague* does not occur in French West Africa. Plague in West Africa has been largely confined to ports and coastal towns. Shipping has been largely instrumental in spreading infection, rats, and rat fleas.

During and after the last war plague was a serious problem in Senegal and Dakar. Plague cases reported from French West Africa in 1920 numbered 14,930. The last bad year was 1930, when 2,240 cases and 1,263 deaths were ascribed to plague. Since then plague cases and deaths have diminished:

		Cases	Deaths
1931	.	1,017	615
1932	.	268	204
1933	.	135	101
1934	.	1,158	794
1935	.	418	207
1936	.	37	24
1937	.	11	9
1938	.	4	0

During the last three of these years all the cases were confined to Dakar and Senegal. The Senegal foci were in the Thiès and Tivaouane subdivisions. The last cases reported in other colonies were: Togo, 1925; Dahomey, 1929; and Mauritania, 1930. French Guinea, the Ivory Coast, and French Sudan appear to have escaped infection. In Niger towards the close of 1937 an outbreak of a disease closely resembling plague was reported in some 13 villages about 22 miles north of Tanout. There were 145 cases and 109 deaths. In 1938 a further 37 cases and 23 deaths were notified. No evidence of a coexisting epizootic among rats could be found. *Post mortem* a bacillus resembling the plague bacillus in appearance was found in spleen and liver, but the identity of the organism could not in the circumstances be established bacteriologically. The evidence seems insufficient to justify a diagnosis of plague.

Anti-plague measures are prosecuted with energy in Dakar. Rat destruction is carried out on a large scale. No infected rat was found in either 1936 or 1937. The work of rat-proofing stores and other buildings receives much attention. There were 20,235 persons vaccinated against plague in 1937 with a vaccine made in the Dakar Pasteur Institute. Similar measures were taken in infected or threatened areas in Senegal: 56,000 rats were destroyed and 100,166 persons inoculated against plague in 1937. A certain amount of rat destruction and rat examination was done in other ports of French West Africa. Valuable as such measures are, they are probably insufficient to explain the marked diminution in the prevalence of plague during recent years. Similar declining incidence has been experienced in many other plague-infected parts of the world. In places which have suffered much the killing of a large proportion of

susceptible rats by plague has resulted in the remaining rat population becoming markedly immune to the disease. In other places meteorological conditions are unfavourable to the spread of the disease at certain seasons; in some such places the persistence of the disease is dependent upon reintroduction of infection from without. During the last two decades much increased attention has been given everywhere to the rat-proofing of ships and to the regular fumigation of rat-infested ships. Such measures, combined with means to ensure that stores and buildings in the vicinity of ports are kept free from rats, can do much to ensure freedom from plague. Barges and lighters used for the loading and discharging of cargo should not be overlooked. They sometimes harbour a surprisingly large number of rats.

The influence of a world-wide war such as this on the prevalence of plague is not likely to be marked. In some infected zones plague prevention measures may have suffered, but the amount of rat-favoured merchandise exported from the worst of the world's remaining centres of plague infection has probably much diminished.

Small-pox

This world-wide scourge that spares few populations inadequately protected by vaccination is reported year after year from nearly all the colonies of French West Africa. The very large number of vaccinations that are performed does much to keep the disease in check, but in present circumstances it is impossible to make vaccination universal. It is impossible to estimate what proportion of the cases that actually occur go unreported; the form of the disease that occurs in West Africa, as in many other parts of that continent, is very mild, so it is likely that many cases would be overlooked even were the size of health services more commensurate than they are with the amount of work to be done. The cases and deaths attributed to small-pox in three recent years were:

	1936		1937		1938	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
District of Dakar	0	0	38	16	56	6
Senegal	241	15	523	37	510	40
Mauritania	110	24	159	20	147	0
French Sudan	1,385	120	1,437	61	625	20
Niger	535	89	113	10	391	74
French Guinea	220	13	293	56	171	19
Ivory Coast	941	49	543	5	270	5
Dahomey	48	13	22	0	166	14
Togo	33	3	0	0	..	..

Dakar was free from small-pox between 1928 and 1937; in the latter year it was reintroduced from Senegal. There were 48,000 vaccinations performed in 1937. In Senegal immigration of labour from the Gambia for ground-nut cultivation was said to be responsible for much of the small-pox of 1937: in that year 195,000 primary vaccinations and 96,000 revaccinations were done. In Mauritania 23,814 vaccinations were performed in 1937. In French Sudan nomads are responsible for the spread of infection: 401,700 persons were vaccinated in 1937. A dried vaccine was used, prepared in the Bamako Vaccine Institute. In Niger, districts bordering Nigeria are most infected; 264,337 vaccinations were done in 1937. In that year vaccinations in the Ivory Coast totalled 732,000, in Dahomey 159,131, and in Togo 172,000. In French Guinea an outbreak started among nomad dealers in kola nuts from Liberia, where little vaccination is said to be done. A second outbreak occurred near the Sierra Leone border. There were 348,000 vaccinations done in 1937.

The total number of vaccinations performed in French West Africa in 1937 was 2,440,503, an amazing figure, representing 15·5 per cent. of the total estimated population.

It need hardly be said that all Europeans employed in Africa should be protected from small-pox by vaccination.

Typhus Fever

The typhus group of fevers comprises a large number of pathological conditions about which our knowledge is continually growing. They are all caused by the invasion of the body by a minute parasite *Rickettsia*, different species or strains of which are responsible for the large number of varieties of endemic typhus found in many different parts of the world, as well as for the much more serious epidemic typhus, devastating epidemics of which have become tragically familiar to our generation as the aftermath or accompaniment of war. *Rickettsia prowazeki* is the cause of epidemic typhus. Devastation, famine, pilgrimages, and mass movements of refugees, resulting in overcrowding, squalor, and dirt, provide conditions in which bodily cleanliness must be difficult for all, impossible for most. With incredible rapidity the louse appears and multiplies. In northern climates typhus fever is not long in following. Infection is spread from the sick to the healthy by the louse. This is a dangerous occupation for the louse, for it too sickens and dies, but there are plenty of others to carry on. The louse does not transmit infection by its bite: the dried excrement of an infected louse is the infectious material.

This obtains entrance into the human body through skin abrasions. In one form of true typhus the rat acts as the reservoir of virus during interepidemic periods.

Typhus epidemics on the large scale are generally at their worst in northern countries and during the coldest months, but louse-borne typhus fever was very widespread and persistent throughout the summer of 1942 in Morocco and Algeria, including the southern territories of Algeria. It would not be very surprising, therefore, if cases of typhus fever should occur among the nomads in the extreme north of French West Africa, but the disease is not likely to be a menace to French West Africa as a whole.

Endemic Typhus

A small number of cases of murine typhus is reported each year from French West Africa; the disease is probably much more widespread than the figures indicate, especially in coastal towns. Cases have been reported from Sierra Leone and Nigeria, where the flea acts as the transmitting agent. During 1937, 14 cases of murine typhus were diagnosed by the Dakar Pasteur Institute; 13 of these cases were from Senegal and one from French Guinea. The virus was isolated from the rats of Dakar in 1935. Only sporadic cases occur and the disease is of almost negligible public health importance.

Another Rickettsia disease, *fièvre boutonneuse*, or exanthematous fever, has been reported from Dakar. In this dogs are the reservoirs of infection and the Rickettsia is conveyed from dog to dog and very occasionally from dog to man, by a dog tick, *Rhipicephalus sanguineus*. This disease likewise is of very small public health, and of no military, importance.

Relapsing Fever

Relapsing fever is caused by a blood parasite called a spirochaete. Here again there are varieties of the disease, of varying degrees of public health importance, in many parts of the world where they are caused by various strains of spirochaete having close affinities one to the others. The two most important varieties of relapsing fever are the louse-borne relapsing fever (*Spirochaeta recurrentis* or *obermeieri*) which was familiar enough in parts of Europe, including England, up to the middle of last century, and the tick-borne relapsing fever (*Sp. duttoni*) which causes large epidemics in east and central Africa. Relapsing fever would not have called for much

notice in a chapter dealing with the health problems of French West Africa had it not been for a deadly epidemic of the louse-borne variety of the disease that smote these territories soon after the close of the last war. The first cases seem to have occurred in 1921 among soldiers, recently returned from Morocco and Algeria, in Kouroussa, on the Niger, near its source in French Guinea. It spread down the Niger. During 1921 and 1922 it was thought to have caused between 80,000 and 100,000 deaths in French Sudan and Niger. In 1924 it was spreading along the Volta and Senegal rivers; at least 20,000 persons died. In 1925 it had reached the Lake Chad region, Northern Nigeria, and the Cameroons. It was noted that races which live in a state of nudity except for a loin-cloth, such as the Bobo, Lobis, Nianigués, Yans, and others, were spared by the epidemic. They provided less harbourage for lice. In September 1926 Darfur in the Anglo-Egyptian Sudan was attacked and in one district 10,000 of a population of 45,000 died. During that devastating epidemic the disease reached the coast at a number of points between Senegal and the mouth of the Niger. Since 1928 only few small isolated outbreaks have been reported.

Had it not been for this outbreak of such unparalleled intensity in the recent past one would have said that such a happening was most improbable in French West Africa.

Being a louse-borne infection, all that has been said above regarding the conditions favouring the dissemination of epidemic typhus fever applies to this form of relapsing fever. The control of the disease necessitates the delousing of the threatened population. Relapsing fever is a readily curable disease. Its diagnosis is generally easy by microscopic examination of the blood, but failing this sporadic cases might readily be mistaken for malaria or other common fever.

In Dakar in 1937 spirochaetes were found in the blood films of 74 patients. Most of these patients lived in the outskirts of the town. These were sporadic cases due most probably to man being infected by a rat spirochaete by means of a tick, *Ornithodoros erraticus*. This form of disease is not severe among the natives and there is a tendency towards spontaneous recovery. The disease may thus have been more prevalent than the figure indicates. In Niger, in the Fada N'Gourma province, a small epidemic of 26 cases with 2 deaths was reported in 1937. The spirochaete responsible was said to be *Spirochaeta obermeieri*, the louse-borne variety. No cases were recorded in 1937 in any other colony of the Federation, or in Togo.

Cerebrospinal Meningitis

This is a serious epidemic disease, almost world-wide in its distribution, which may give rise to serious epidemics in overcrowded communities. It is one of the health anxieties of war-time conditions. Sporadic cases are frequently reported from many of the French West African colonies, and epidemics of varying degrees of intensity are a common occurrence in Niger, more especially in the provinces adjacent to the northern frontier of Nigeria. The disease is not uncommon in the adjacent Chad Territory of French Equatorial Africa. Zinder is commonly the centre of these epidemics. The French reports commonly state that infection was introduced from Nigeria; this is possible. The disease usually makes its appearance at the beginning of the cool dry season. Chills and dust storms are said to be factors of importance favouring the spread of infection; promiscuous overcrowding in dark unventilated huts, which is common at this season, undoubtedly provides facilities for its rapid spread. In 1937 the outbreak started later than usual. Between mid-April and the end of June 521 cases with 345 deaths were reported from the provinces of Birni-N'Konni, N'Guigmi, Gouré, Maradi, Zinder, and Tahoua, which were attacked successively. A case mortality rate of 66 per cent. suggests that only very serious cases were notified. Cases outside the main centres were probably not notified.

Sporadic cases reported from other colonies in that year numbered: Dakar 13, Senegal 7, French Sudan 8, and Togo 1. These cases that occur west of the upper Niger are usually of a mild type and there is not the same tendency to spread.

Intestinal Infections: Dysenteries, Enteric Fever, Diarrhoea

In all tropical and subtropical countries digestive upsets and intestinal infections are apt to be much more frequent and much more harmful than in temperate climes. Climatic conditions *per se* are responsible only in so far as they facilitate the more rapid decomposition of certain foodstuffs, and enervate man's power of resistance to parasitic invasion of all kinds. The primary cause of the high incidence of diseases of this kind is to be found in the low hygienic standards so commonly prevailing in tropical climes. Nearly all intestinal infections, including the typhoid and paratyphoid fevers, the dysenteries, cholera, and certain forms of diarrhoea, are caused by the ingestion, with food or drink, of germs that are derived from the excreta of other human beings. Water so contaminated may be drunk or

used for washing kitchen utensils, or vegetables to be eaten uncooked; the common house-fly on the breakfast table may have recently visited similar material; soiled fingers may have come in contact with infection; dust may contain germs of intestinal infection. It is not only the sick and convalescents that excrete infective germs. Healthy individuals may continue to harbour and excrete dangerous germs for long periods, even for years, after all signs and symptoms of infection are passed. All these disquieting facts emphasize the necessity for the rigid enforcement of a high standard of personal hygiene where the sanitary disposal of human excreta and the safeguarding of water-supplies are so difficult to achieve. In the countries we are now considering that difficulty is extraordinarily great. The washing of one's hands before partaking of food is a health measure of no small importance. Every water-supply should be regarded as suspect until the contrary is proved. Milk should always be boiled. Visitors to all tropical countries should be protected by vaccination against diseases of the typhoid-paratyphoid group.

In French West Africa the risk of cholera can be ignored. The disease has never gained a foothold in this part of the world. No satisfying explanation of the freedom of tropical Africa from cholera has been advanced; conditions appear to be favourable enough for its spread. The population possesses no special immunity against cholera. There is, however, no reason to fear that its long-continued freedom from a dread disease should not continue.

The dysenteries are widely prevalent in French West Africa. The number of cases that are reported are but a small proportion of the total. Of the two chief forms of dysentery, amoebic and bacillary, the former is most in evidence. In the following paragraphs the numbers of cases reported refer to the year 1937.

In Dakar there were 1,344 cases of amoebic dysentery, a four-fold greater incidence than in either of the two previous years. There were also 105 cases of bacillary dysentery. Dysentery is most in evidence at the beginning of the rainy season; cases are for the most part mild. The Dakar Pasteur Institute isolated dysentery bacilli in 14 cases; the strains were: Shiga 1; Hiss 6; Flexner 4; and Castellani 3.

In Senegal 2,519 cases of amoebic dysentery and 5,359 cases of bacillary dysentery were recorded. The diagnosis of bacillary dysentery lacked laboratory confirmation. Dysentery was most prevalent at the end of the hot season, and especially along the Senegal river, in Sine-Saloum and Casamance.

In Mauritania 69 cases of amoebic dysentery were treated. The disease is confined to districts bordering the Senegal.

In French Sudan dysentery cases numbered 3,726. Both amoebic and bacillary forms of the disease are said to occur. Amoebae were found in 20 European and 144 native cases.

In Niger of 769 cases half were reported from Niamey.

In the Ivory Coast 6,108 natives and 137 Europeans were treated for amoebic dysentery; there was 1 case of liver abscess. There were 68 cases with 6 deaths ascribed to bacillary dysentery on clinical grounds alone.

In Dahomey 1,261 native and 25 European cases of amoebic dysentery were treated; 602 of these occurred in the Porto Novo area.

In French Guinea the 2,658 cases of amoebic dysentery treated represented 5 per cent. of the total morbidity. The hospital case mortality rate of amoebic dysentery was 5·8 per cent. There were 21 sporadic cases of bacillary dysentery notified.

In Togo there were 2,248 cases of amoebic dysentery, 3 cases of liver abscess, and 689 cases in which a clinical diagnosis of bacillary dysentery was made.

Diseases of the typhoid-paratyphoid group seem to be surprisingly rare throughout West Africa. Many Europeans are protected by vaccination. It would seem probable that many cases among natives are overlooked. The only cases reported in 1927 were: 2 European cases in Niger; 4 native cases with 2 deaths in Dahomey; and 2 European cases in French Guinea.

Ankylostomiasis

Ankylostomiasis or hookworm disease is very widespread on the west coast. It is only here and there that very severe cases presenting the classical signs of the disease are to be found, but the proportion of natives infected with hookworms appears to be high almost everywhere. It would seem that the disease has received less attention in French West Africa than its public health importance merits. Hookworms too few in number to produce profound anaemia or marked incapacity may nevertheless be quite sufficient to render their host much more vulnerable to many intestinal and other infections. They are regarded by many as one of the causes of the mental and bodily lethargy of some West Africans. Hookworm campaigns have often resulted in much increased capacity for work, and diminished sickness and death rates, even in places where the

graver forms of ankylostomiasis were unknown. The adult worms live in the small intestine attached to the gut wall, from which they suck blood. Their eggs leave the human body with faeces. The larvae that develop may penetrate the skin of feet or ankles of persons walking unshod on contaminated soil. From the point of entry the larva undertakes an adventurous journey to the small intestine, where it attains maturity. The prevention of the disease may be secured by the proper disposal of excreta, and by never walking about unshod on ground that might have been contaminated with human excreta. The only French West African report for 1937 that made special reference to hookworm disease was that of Togo: it said that ankylostomiasis was very widespread in all parts of the territory and that 9,683 very severe cases had been seen during a special survey.

Other Intestinal Parasites

Very numerous are the intestinal parasites that infect the West African natives. An idea of the relative prevalence of the most common may be obtained from the following table, which gives the results of the examinations of human excreta carried out in the laboratories of French West African colonies in 1937:

<i>Parasite</i>	<i>Dakar</i>	<i>Senegal</i>	<i>French Guinea</i>	<i>French Sudan</i>	<i>Niger</i>	<i>Ivory Coast</i>	<i>Dahomey</i>	<i>Togo</i>
Flagellates . . .	247	2	82	14	..	36	97	161
Ascaris . . .	386	39	247	1	31	90	307	3,416
Ankylostomes . . .	255	99	405	30	42	276	345	2,865
Trichocephalus . . .	63	8	76	5	4	63	128	48
Oxyuris . . .	19	..	27	..	..	6	38	174
Anguillulidae . . .	91	..	37	..	..	13	218	116
Taenia . . .	107	7	358	1	1	16	19	33
<i>Strongyloides stercoralis</i> . . .	..	16	..	1	..	..	..	..
<i>Dipylidium caninum</i> . . .	..	1	..	..	..	..	..	..
<i>Hymenolepis nana</i> . . .	..	2	..	..	..	..	..	..

The Togo figures are large, the results of a special investigation comprising 23,543 examinations. Elsewhere the figures represent the results of routine examinations, which were few in Senegal, French Sudan, and Niger.

Schistosomiasis

Schistosomiasis results from the invasion of the human body by

small trematode worms of the genus *Schistosoma*. Two species are responsible for the disease in French West Africa: *Schistosoma haematobium*, causing the urinary form of the disease, and *Schistosoma mansoni*, the cause of the rectal form. The eggs of these two species reach the exterior of the body in urine or faeces. If the eggs are deposited in water a ciliated embryo hatches out and enters a fresh-water snail, where development takes place resulting in the formation of cercariae. These escape from the snail into the water, where they are able to penetrate the skin of a suitable host, including man, with which they may come in contact. Having penetrated the skin they find their way to the site of election, *S. haematobium* to the bladder, *S. mansoni* to the rectum. Here they reach maturity, and the cycle begins again. Sometimes the human host suffers but little inconvenience. Sometimes the results are distressing in the extreme. The species of snail that harbours *S. haematobium* during its development, in parts of West Africa, has been shown to be *Physopsis globosa*, a snail with a very inflated, sinistral shell, which lives in slow-moving, shady streams with mud bottoms. It is common in bathing-pools close to villages, and is able to live in water fouled with excrement.

In Dakar during 1937 there were 292 cases of the urinary form of the disease reported, but only 2 of the rectal form. In Senegal all but 2 of the 2,269 cases recorded were *S. haematobium* infections; 1,675 of these were in Sine-Saloum. *S. haematobium* is very widespread in Mauritania. The natives consider the infection as negligible: it is only when complications ensue that they seek relief. It was the cause of 125 consultations in 1937. It is most prevalent in the south, particularly in the Kiffa district.

In French Sudan there were 4,598 cases of vesical schistosomiasis recorded in 1937, and 413 in Niger. The N'Guigmi and Zinder provinces were responsible for half the Niger cases. In the remaining colonies the numbers of consultations were: Ivory Coast 2,055; Dahomey 114 (*3 S. mansoni*); French Guinea 403 *S. haematobium* and 46 *S. mansoni*; and Togo 2,934.

These figures give no indication of the extent of the prevalence of the disease. In French Guinea, for example, it is stated that the infection is very widespread in spite of the fact that but few cases were treated. In the Kissidougou province of French Guinea *S. mansoni* is very prevalent. The Togo cases include both forms of the disease, but here, as in most other parts, *S. haematobium* cases are much the more numerous: the most heavily infected part of Togo is in proximity to the lagoons.

In a suspected area the examination of the urine of a number of local native children would reveal the presence or absence of infection. Collections of water containing snails that might act as intermediate hosts of *Schistosoma* should be placed out of bounds for troops. Infected or dangerous water can be made safe for washing by the addition of cresol (1 in 10,000) or by storage for 48 hours.

Dracontiasis

Dracontiasis is the invasion of the human host by a Nematode worm, *Dranunculus medinensis*, the Guinea worm. The adult female worm, though only a millimetre or so in diameter, may attain the length of a yard or more, and is found in the connective tissue between muscles or under the skin. When mature it generally moves down to the leg, ankle, or foot, where a small hole is bored through the deeper layers of the skin. Over this a blister forms, bursts, and leaves a small ulcer through the base of which the worm discharges myriads of embryos. The uterus occupies the greater part of the worm. The discharge of embryos is intermittent and can be stimulated by the application of cold water to the limb near the ulcer. The first stage in the extra-corporeal life of the embryo must be in water. If attempts be made to extract the worm before parturition is complete the consequences may be disastrous. If the worm snap the uterine contents may escape and give rise to violent inflammation, abscesses, and sloughing. Cold douches for two weeks or so may be necessary before parturition is complete: the worm may then be slowly wound out. Alternatively the worm may be killed when protruding by injecting it with a solution of perchloride of mercury: it can then be extracted after twenty-four hours.

The embryos of the Guinea worm, discharged into water, enter the body of a minute fresh-water crustacean, cyclops. Man is probably infected by drinking water containing infected cyclops.

Guinea worm is responsible for much ulceration and incapacity in many parts of French West Africa. In 1937 cases treated numbered, Senegal 659; Mauritania 567; French Sudan 2,354 (most prevalent in Tougan and Ouahigouya provinces); Dahomey 925 (602 in the lagoon region), and Togo 657. The disease is not mentioned in the report from French Guinea, where it almost certainly occurs.

Filariasis

Many reports make reference to the presence of microfilaria in the

blood, discovered for the most part during the examination of blood smears for malaria parasites or by sleeping-sickness survey parties. There were 1,559 cases in Dahomey and 4,921 in Togo. Two species of blood filaria are commonly found, *F. bancrofti* and *F. perstans*. The former is the more important. Only larval forms of the parasite are found in the peripheral blood; the parent forms are usually to be found coiled up in the lymphatics of the trunk or extremities. The larvae of *F. bancrofti* are found in the blood only during the hours of darkness. Certain species of culicine mosquitoes transmit infection from man to man, and most mosquitoes have nocturnal habits.

In many cases of filarial infection no injurious influence is manifest. Sometimes, however, the parent worms obstruct the lymphatics and cause lymphangitis, varicose lymphatic glands, lymphatic varices, chyluria, or elephantiasis. Elephantiasis is the name given to the sometimes enormous swelling of the lower extremities and less commonly of the scrotum, arms, mammae, or vulva. Cases of elephantiasis are by no means uncommon on the west coast.

Yaws

In the tropical part of West Africa with heavy rainfall and thick forest vegetation no endemic disease is more prevalent than yaws. Yaws, also called framboesia or pian, is a contagious, chronic disease of the tropics, caused by the *Spirochaeta pertenuis*, which is very similar and very closely related to *Sp. pallida*, the cause of syphilis. Morphologically, the two spirochaetes are indistinguishable, but yaws and syphilis are quite distinct clinical entities. Syphilis is essentially a venereal disease; yaws is not. Syphilis is world-wide in its distribution; yaws is confined to tropical climes. Yaws tends to spontaneous cure; syphilis does not. Tertiary syphilis tends to involve the central nervous system; yaws very rarely does so. Yaws is more readily cured with antisyphilitic remedies than is syphilis. Yaws confers upon its victim a certain immunity to syphilis infection but the immunity may not be absolute. *Sp. pertenuis* is confined to the outer or ectodermal tissues of the body; *Sp. pallida* may invade all parts of the body.

Infection with yaws is acquired through skin abrasions by mechanical contact or by certain species of fly. The primary sore is often superimposed on a pre-existing non-specific sore. It is pre-eminently a disease of childhood; primary cases in adults in hyperendemic areas are rare. Ten to twelve weeks after the appearance of the primary

sore there is a generalized eruption consisting of raised papules, somewhat raspberry-like, which may be scattered all over the body or confined to certain skin areas. These may ulcerate or be absorbed, leaving darkly pigmented areas. The ulcers may be deep, leading to caries, gangrene, periostitis, contractions, and ankyloses. A thick, hardened condition of the skin of the soles and palms, sometimes with ulcerative fissures, may be a characteristic result. Gangosa, a destructive ulcerative condition of the nose, may be a manifestation of yaws. Juxta-articular nodes are not an uncommon manifestation of tertiary yaws. Goundou, a disease characterized by symmetrical tumour formation on either side of the nose, is believed to have some connexion with yaws. It is fairly common in the Ivory Coast but is said to be rare in French Guinea.

In French West Africa yaws is rampant in the Ivory Coast, French Guinea, Dahomey, and Togo. It does not occur in Mauritania. In Senegal the disease is confined to the Casamance, Sine-Saloum, and upper Gambia regions: there were only 1,918 cases treated in 1937. In French Sudan the incidence is low, the disease being confined to territory south of the Niger, in the Bamako, Sikasso, San, Tougan, and Ouahigouya provinces. In 1937 cases of this disease treated numbered only 179. In Niger no cases were recorded in 1937; the incidence in any case would be low and confined to the south-west corner. In the Ivory Coast 107,267 consultations for yaws were recorded in 1936, 93,799 in 1937; these figures are nearly thrice as numerous as consultations for malaria. In Dahomey yaws and malaria are the dominant endemic diseases; consultations for yaws numbered 28,608 in 1937. In Togo yaws is very prevalent and was responsible for 48,584 consultations in 1937, equivalent to 8·8 per cent. of all cases of sickness treated. In French Guinea the distribution of yaws is more patchy: it is most prevalent in the forest belt; the Kissidougou, Guékédou, Macenta, N'Zérékoré, and Beyla provinces are all heavily infected. The disease is less frequent on the coast and rare in the cleared uplands and towards the Sudan. Here one sees the favouring influence of heavy rainfall and thick forest vegetation on the prevalence of yaws. In places where there is less dense vegetation with a dry season, and where the harmattan blows, yaws prevalence diminishes. Altitude and temperature variations *per se* are not the important factors. The disease is more active in the rainy season than at other times. The influence of heavy rain is probably indirect; heavy rainfall means more luxuriant vegetation, greater liability to skin abrasions, and possibly an increase in the number of flies which, in other parts

of the world and probably in West Africa, play a part in the transmission of the disease.

It is probable that the numbers of cases treated in the different colonies, mentioned above, great as some of them are, give but an inadequate idea of the extent of yaws prevalence. Yaws has existed from time immemorial and the natives regard it as one of the inevitable complications of life, and only rarely would medical aid be sought for mild cases. Special investigations have often disclosed a 100 per cent. infection rate. This was the case in the Wum tribe inhabiting the northern province of the Cameroons under British mandate. The British West African colonies suffer as much as the French. In the Gold Coast, in 1938, 61 per cent. of the 124,000 cases of infective diseases treated were cases of yaws.

In favourable conditions the practical control of yaws can be attained by the treatment of infected persons. It is a readily curable disease. A short course of treatment, six weekly injections of bismuth salicylate, effects a very large percentage of cures. In all the French colonies of West Africa good results have been obtained with oily suspensions of bismuth salicylate. It acts less rapidly than arsenical preparations, but its effects are more lasting. This is important, as natives rarely persevere with treatment.

Phagedaenic Ulcers

Phagedaenic ulcers bulk large in West African medical practice, more especially in the hot humid parts of the country. Quite apart from ulceration due primarily to specific causes, such as yaws and Guinea worm, all wounds, even the most trivial, among natives, if not looked after, tend to spread, eating away the surrounding tissue. Sometimes the results are terrible. In most parts of the country cases are most numerous in the rainy season. The cases are often slow to respond to treatment and healing is generally a slow process. In Mauritania cases are rare. Cases occur in the Sahara regions of French Sudan but much less frequently than in the tropical south. Cases are less frequent in Niger than elsewhere in French West Africa, Mauritania excepted.

Venereal Diseases

Syphilis is very prevalent throughout French West Africa. In 1937 it was responsible for 6 per cent. of all cases treated in hospitals and dispensaries. As noted above, yaws confers on its victims a considerable degree of immunity to syphilis, and in those parts of tropical West

Africa where yaws abounds syphilis is much more prevalent in towns than in villages, whereas yaws has a more rural distribution. In recent years there has been a marked increase in the number of syphilis cases treated, due, in part, to an extension of medical activity. A very large proportion of the patients who present themselves for treatment suffer from lesions characteristic of the tertiary, advanced, stage of the disease, in spite of which neuro-syphilis is a very rare condition.

In Mauritania syphilis comes second only to malaria as a cause of sickness among dispensary patients. In French Sudan and Niger the disease is especially prevalent among the nomad populations. In Senegal the number of cases treated doubled between 1935 and 1937; the rural medical services expanded during this period and they found syphilis widespread everywhere. In the Ivory Coast the number of consultations for syphilis is about half the number for yaws. In Dahomey most cases seen were suffering from tertiary syphilis, but neuro-syphilis was rarely seen. In French Guinea, hospital and dispensary returns show syphilis as responsible for 7.5 per cent. of the total morbidity, but this is stated to be an inadequate expression of the real prevalence. The number of consultations for syphilis in the medical institutions of the colonies in 1937 were:

Dakar	8,619
Senegal	53,374 (mostly tertiary cases)
Mauritania	9,239
French Sudan	13,417 (most prevalent among nomads)
Niger	4,392 (1,432 in Agades, nomads)
Ivory Coast	49,580
Dahomey	12,989 (mostly tertiary cases)
French Guinea	37,849 (7.5 % of all cases)
Togo	<u>11,466</u>
	200,925

There would seem to have been a real increase in the incidence of syphilis in not a few parts of West Africa, an increase not confined to French territory alone. In the Kano division of Nigeria, in 1940, 27.5 per cent. of all cases diagnosed were venereal disease, and in Kano station itself the frequency of venereal disease in relation to total morbidity had increased from 8 per cent. in 1930 to 22 per cent. in 1940. Twelve per cent. of Africans admitted to Nigerian hospitals in that year were suffering from venereal disease, more than double the number admitted for malaria. In the Gold Coast, on the other hand, syphilis is not a common disease; there is

very much yaws. In the north of the Gold Coast syphilis is rare except among persons who have returned from the mines or the towns.

Gonorrhoea is very prevalent: 57,000 cases were treated in French West Africa in 1937. It is unlikely that any large proportion of uncomplicated cases would present themselves for treatment. Gonorrhoea is believed to be responsible for much ill health among African females.

Soft chancre is common.

Leprosy

The number of known lepers at the end of 1937 was:

Ivory Coast	15,489
French Sudan	11,741
French Guinea	7,355
Togo	3,869
Dahomey	3,145
Senegal	2,549
Niger	1,085
Mauritania	26

In the Ivory Coast and in Togo sleeping-sickness survey parties discovered a large proportion of the new cases.

The Centre d'Études at Bamako, French Sudan, is the pivot of leprosy prevention measures in French West Africa. In some colonies isolation villages have proved a success. Agricultural leper colonies are being tried in French Sudan, Togo, and Dahomey.

Tuberculosis

Tuberculosis was probably almost unknown in tropical West Africa before it was opened up by European enterprise. As a consequence the African offered little or no resistance to infection. A good example of their susceptibility was furnished in the medical history of the last war. Senegalese soldiers were in camp at Fréjus in the French Riviera; when first tested with tuberculin only 4·5 per cent. gave a positive reaction. In 1916, 48 died from tuberculosis; 312 in 1917; 557 in 1918; and 298 in the first five months of 1919.

The number of cases of tuberculosis treated each year in French West Africa is an insignificant proportion of the total hospital and dispensary attendances, but the number is increasing. In 1935 there were 1,660 cases; in 1936, 1,883; and in 1937, 5,142. The report stated that tuberculosis was a grave social problem for Dakar.

The following table shows the distribution of the cases of tuberculosis treated, as well as the extent of medical activity in the colonies of French West Africa for the year 1937:

	<i>Total attendances at dispensaries and admissions to hospital</i>	<i>Cases of tuberculosis diagnosed</i>	<i>Tuberculosis %</i>
Dakar	222,510	928	0·41
Senegal	627,511	579	0·09
Mauritania	53,044	23	0·04
French Sudan	280,493	2,014	0·7
Niger	122,551	66	0·05
Ivory Coast	932,525	1,152	0·12
Dahomey	375,915	143	0·03
French Guinea	504,001	237	0·04
French West Africa	<u>3,118,550</u>	<u>5,142</u>	<u>0·16</u>

These figures are hardly indicative of very widespread infection. Reports contain very few references to special inquiries on the subject. It is noted that 29 per cent. of the schoolchildren of Abengourou in the Ivory Coast gave positive tuberculin skin reactions, a high rate in the circumstances. Tuberculosis is common among half-castes in Dahomey. Most of the French Guinea cases were seen in Conakry and Kindia. The increase in the number of tuberculosis cases in French Sudan is remarkable; 1935, 66; 1936, 511; 1937, 2,014. What proportion of this increase is due to expanded medical activity is unknown. Evidence that the authorities are giving serious attention to tuberculosis is afforded by the efforts made in Dakar, French Guinea, and French Sudan to extend the immunization of new-born infants with B.C.G.

In Mauritania the dry climate, heat, sunlight, and tent life are said to be adverse to the spread of tuberculosis. In parts of French Sudan, likewise, the climate is said to be favourable for sufferers from this disease. Elsewhere the climate is distinctly unfavourable and the case mortality rate of the relatively small number of cases treated as inpatients is high.

Pneumococcus Infections

The pneumonias rank high among the killing diseases of West Africa. It is most fatal to naked or little clad very young children and generally most prevalent in the harmattan and cool seasons. In French Guinea in 1937 pulmonary infections were said to be responsible for 53 per cent. of the morbidity and 43 per cent. of the mortality of infants in the first year of life and in older infants for

21 per cent. of the morbidity and 44 per cent. of the mortality. The experience of British colonies is similar. In Lagos in 1940 pneumonias and pleurisy were responsible for 22·5 per cent. of the deaths at all ages and for two-thirds of the deaths at ages 0 to 3. Lagos is well equipped medically. In general the black races have much more feeble resistance to the pneumococcus than have the white. The case mortality rate of cases treated in hospitals is high, often 25 to 30 per cent.

Other Communicable Diseases

Influenza cases were reported from all French West African territories in 1937, except French Sudan and Dahomey. *Whooping cough* is not uncommon; Niger reported 2,120 cases and French Guinea 1,219. *Measles* occurred in all the colonies—1,323 cases in French Guinea. *Mumps* and *chicken-pox* were not infrequent. Of the 38 cases of *diphtheria* reported, 30 were in Dakar; 28 of the total cases seen were European. Only 6 cases of *scarlet fever* were diagnosed, all European.

Tetanus is prevalent. Umbilical infection of the newly-born infant is not uncommon. In Senegal cases have been observed after the perforation of the lobes of ears for earrings.

Rabies is widespread, but the number of persons undergoing Pasteur treatment is not large. In Dakar the classic Pasteur method of treatment is still in use. In the other colonies stocks of carbolized virus, supplied by the Dakar Pasteur Institute and renewed every three months, are kept on ice and used as required.

Trachoma is widespread. Cases treated in 1937 were:

Dakar	553	cases (2,258 in 1936)
Senegal	1,626	" (mostly in the Sine-Saloum and Baol provinces)
Mauritania	13	" (localized to region bordering R. Senegal)
French Sudan	1,194	" (widely diffused; complications frequent)
French Guinea	625	" (in Fouta Jalon and east of it),
Dahomey	325	" (widespread in Natitingou and Parakou provinces)
Ivory Coast	9,567	" (probably includes cases of chronic conjunctivitis)
Togo	4,243	" (most cases found during trypanosomiasis surveys)

Maternity and Child Welfare

Each year important progress is reported in this most difficult and important branch of public health activity. The number of maternities increases continually and here native midwives receive training so that the spheres of influence of maternities constantly grow. In the work of child welfare centres official agencies receive valuable help

from Catholic and Protestant Missions, from L'Association des Dames Françaises de la Croix-Rouge, from the Sudan Red Cross, from the Union des Femmes de France, and from other philanthropic organizations.

As an instance of the expansion of maternity work the following facts concerning French Guinea are of interest. The total population of French Guinea approximates 2,000,000. Of these some 800,000 are within reach of medical care. The birth-rate is about 50 per thousand; that is to say, some 40,000 births a year may be expected in the areas thus cared for. In 1937, 3,009 confinements took place in maternities; 2,195 were attended in native homes by midwives of the maternities, and some 5,000 by midwives who had received training in maternities. Thus about a quarter of the total births were more or less controlled.

Health Administration

The General Inspectorate of the Health Services, which is under the direction of a Medical Inspector-General of Colonial Troops, is the central authority which from Paris directs, supervises, and controls all the health organizations of the French colonial possessions. There is also a Supreme Health Council for the Colonies in Paris.

The Public Health Services of French West Africa are under an Inspector-General of Medical and Health Services, who resides with the Governor-General at Dakar and acts as his adviser on medical questions. This Inspector-General, who is also Principal Medical Officer of the Troops, is responsible for the application of the public health laws. He has as assistant a travelling Director of Public Health, who keeps himself and his chief informed of any unusual epidemic manifestations. There is a Supreme Public Health and Sanitation Board which assists the Governor-General in framing health regulations.

Each of the separate West African colonies has a Chief of the Health Service, who is responsible, under the Governor, for the work of the Medical Service. Each colony has also a Public Health and Sanitation Board.

Public health work received much increased attention in the inter-war period. Budgetary credits for medical and health work in French West Africa for 1924 totalled just over ten million francs, 5·5 per cent. of the total local budget. The sanitary and medical expenditure budgeted for in 1934 totalled 54 million francs:

Sanitary and Medical Service Expenditure, 1934 (in millions of francs)

		Personnel	Material	Total
General Budget: School of Medicine	1·1	1·4	2·5	
District of Dakar	3·9	4·2	8·1	
Senegal: local budget	1·5	1·2	2·7	
hygiene and medical assistance	4·2	2·4	6·6	
Mauritania	0·4	0·3	0·7	
French Sudan	3·0	2·3	5·3	
French Guinea	2·8	1·2	4·0	
Ivory Coast (including Upper Volta)	5·2	2·7	7·9	
Dahomey	3·0	1·4	4·4	
Niger	1·4	0·6	2·0	
Loan . . . . .	..	9·9	9·9
Total, French West Africa	26·5	27·6	54·1	

French West African School of Medicine

This school was founded at Dakar in 1918. It affords training for native doctors, chemists, veterinary surgeons, and midwives. Students are recruited by competitive examination from among the pupils of the Lycée Saint-Louis and others who possess a diploma of higher primary education. Midwifery candidates are selected by competitive examination open to all higher schools in West Africa. The medical course lasts 5 years. The course for chemists is 4 years, and for midwives 3 years. Successful students are appointed to well-paid government posts. The Dakar native hospital, a polyclinic, a native maternity hospital, a crèche, a tuberculosis dispensary, a gynaecological dispensary, a venereal diseases dispensary, and a dispensary for skin diseases, together constituting the Social Health Institute of Dakar, provide very ample clinical material for teaching.

Pasteur Institute and Laboratories

It is impossible to write of the health conditions in any of the French colonies without paying a tribute to the Pasteur Institute of Paris which has been the source of inspiration of French medical research workers everywhere. Every year a number of the members of the French Colonial Health Service were appointed to follow a course at the Pasteur Institute of Paris, and a stream of research workers found their way from the Pasteur Institute to study problems of tropical pathology. Pasteur Institutes have been founded in many colonies, some of them directly affiliated to, and all in close touch with, the parent institute.

The first laboratory in French West Africa was founded by

Medical Equipment of French West Africa, 31 December 1935

	Dakar and Senegal	French Sudan	French Guinea	Ivory Coast	Dahomey	Niger	Mauritania	FRENCH WEST AFRICA
Hospitals	3	3	1	1	2	1	..	11
Medical centres and infirmaries	36	26	27	38	18	24	1	170
Dispensaries	22	21	9	23	23	..	14	112
Maternities	12	16	17	38	15	5	..	103
Leper asylums	3	..	..	1	..	1	..	5
Sleeping-sickness treatment centres . . . .	..	..	2	5	1	1	..	9
Lazarets	4	..	1	..	1	2	..	8
Beds, European	386	104	74	111	66	10	..	751
,, Native	1,199	665	741	664	443	256	6	3,974
<i>European Personnel</i>								
Doctors:								
Military	9	4	1	2	1	2	2	21
,, (supernumerary)	27	18	14	29	9	9	5	111
Civil	5	2	1	3	3	1	..	15
,, (supernumerary) . . . .	..	2	..	4	..	..	..	6
Foreign auxiliary	6	6	2	..	2	5	..	21
Private	15	..	..	1	..	..	..	16
Dentists	4	..	1	..	1	..	..	6
Pharmacists, military	2	..	..	..	..	..	..	2
,, (super-								
numerary)	4	1	1	1	1	1	..	9
Pharmacists, private	5	1	1	1	1	..	..	9
Military male nurses	23	8	2	9	6	1	..	49
Health agents	8	..	..	2	..	..	..	10
Colonial Service nurses	11	2	1	2	2	..	..	18
Visiting nurses	1	1	..	..	1	1	..	4
Midwives	3	..	..	1	..	..	..	4
<i>Native Personnel</i>								
Doctors	26	25	26	34	19	6	3	139
Pharmacists	4	2	2	5	3	1	..	17
Midwives	19	27	28	41	44	11	..	170
Assistant doctors	14	2	4	5	5	..	..	30
Male nurses	103	163	138	213	108	70	..	861
Health agents, &c. . . .	244	29	16	34	7	33	21	363
Female nurses	23	10	..	30	17	9	..	96
Visiting nurses	3	6	4	11	16	..	..	40

Marchoux at St. Louis in 1897. It was subsequently removed to Dakar and has become the central Institute of Biology for French West Africa. It has three sections, human microbiology, veterinary

microbiology, and biological chemistry. It has done much valuable research work and manufactures vaccines and sera.

A laboratory at Bamako was founded by Bouffard in 1906. Interesting trypanosomiasis research work was done there. At present leprosy control work is centred in Bamako.

There is a laboratory at Kindia. Vaccines are made here. Two and a half miles away, on a plateau nearly 4,000 feet high, a centre of biological study was created at Beko. Veterinary vaccines and sera were made here.

A laboratory was founded in 1910 at Grand Bassam, and was engaged chiefly on anti-mosquito work.

CHAPTER VI

HISTORY

THE PRE-CHRISTIAN ERA

IT may be said that West Africa, its countries and its peoples, were as undiscovered, in pre-Christian times, as were the Americas. The Sahara was an effective barrier until camels were introduced. If any man crossed it, he failed to leave a record behind him. The east coast of Africa was known in very early times, but there is no record of penetration from it into West Africa. The western coasts may have been seen by some adventurous voyagers, and there are records of four attempts to circumnavigate the continent.

The first, somewhere about 600 B.C., was an expedition dispatched by Necho, the Pharaoh of the time. His crews were probably Sabaeans, for they already knew the east coast. As Herodotus tells us, this expedition sailed down the east, rounded the Cape and returned by the Mediterranean. It is possible that it actually did so, for the dangers can hardly have been greater than those of other contemporary voyages. Even if it actually occurred, this voyage, like those which followed later, brought no useful knowledge of West Africa back with it.

Sataspes the Persian sailed from Egypt 130 years later (470 B.C.), but started in the opposite direction. According to his narrative his ship was brought to a stop, and could sail no farther, after he had seen dwarfs. The dwarfs may have been pygmies, and he may have been brought to a standstill by a mixture of adverse current and failing wind. If so, the Benguela current, in equatorial waters, suggests itself. It proved an unfortunate voyage. Sataspes returned to a violent death and yet has left us no wiser. Few early voyages have aroused more controversy than that of Hanno the Carthaginian in 445 B.C. He started, well equipped, as a forerunner of Carthaginian trade and settlement. The balance of opinion is that he got no farther south than Sierra Leone. His descriptions are difficult to follow, and his contributions to knowledge of West Africa negligible.

Eudoxus, the Greek, made the last of these early voyages in 120 B.C. but does not seem to have got so far as Hanno.

THE MOVEMENTS OF PEOPLES

It is a matter of native tradition that pygmies with large heads and

reddish complexions inhabited the land when the negro peoples first arrived. The invasion is held to have been peaceable. From the configuration of the land these black men can only have come from the east or south-east. There seem to have been at least two waves of invasion, at the end of which West African pygmies were completely destroyed or absorbed. In the extreme south-east of the block of country we are considering there are Bantus, or races speaking a Bantu tongue, with certain distinctions of frame and stature, but whether the West African negro comes after or before the Bantu-speaking peoples, or whether invasions continued to overlap in time is obscure. As these black peoples spread westwards to the Atlantic coast, and northwards as far as the raising of their crops would permit, they met Berber and Arab nomads coming, no doubt in small numbers, across the Sahara. From Egypt there seems to have come a sprinkling of Semites, including Jews, or professing Jews, and Arabs appeared from the Anglo-Egyptian Sudan. From Roman times onwards camels greatly helped these hardy adventurers. The Fulani, a Hamitic race which now speaks a negro language, were early arrivals. Their past is shrouded in mystery, but the general impression is that they wandered, from east to west, across the south edge of the Barbary States, came down the coast of Mauritania and lived for a time in the west, just sufficiently far north to escape the ravages of the tsetse-fly and to be able to maintain their pastoral life. They seem to be akin to the Gallas of Abyssinia. In historical times many of them have moved east again.

From very early, then, these copper-coloured nomads, Arabs, Berbers, and Fulani, have been in close touch with the negro peoples, and have mixed freely with them. The slave trade has spread negro blood far to the north, whilst the nomads have never penetrated the forest belt, nor even closely approached it, for cattle cannot exist there. These northern peoples have affected the customs and organization of the Negroes, but, for all that, negro blood predominates wherever agriculture is possible. As the history to follow will show, the earliest negro empires grew up where agriculture and cattle farming meet, where trans-Saharan trade began, and where racial mixture had supplied the greatest stimulus.

The most famous chronicler of early times is the Moor Leo Africanus. This Berber Herodotus was born in Granada in 1494 or 1495. His parents, leaving Granada after its capitulation to Ferdinand and Isabella, settled in Fes, where Leo completed his education and began life as a religious magistrate (*kadi*) and writer of verses. His

travels ranged from Guinea to Persia, and it was as a captive in Rome, and a very temporary Christian, that he wrote, in Italian, his book on Africa. He was an acute and witty observer, but misled generations to come by insisting that the Niger found its way westwards from Timbuktu to the Atlantic. His pages bear eloquent testimony to the wealth and pomp of the cities of the Sudan, to the importance of the slave trade even in those days, and to the security of trade and travel. 'The journey indeed is very long, but yet secure and void of danger.' He died at Tunis in 1552.

Thereafter Europeans begin to take up the story.

THE MEDIEVAL NEGRO EMPIRES (FIG. 45)

Before proceeding to European exploration it is necessary to deal with the three large medieval negro empires of:

- (i) Ghana
- (ii) Mali, or, as it is generally known in English, Mandingo.
- (iii) Gao or Songhai.

There are also the three lesser, though by no means inconsiderable

- (iv) Moshi (or Mossi) States, of Ouagadougou, Yatenga, and Fada N'Gourma, which, at their zenith, were well organized and reached a high degree of civilization.

The earlier history of these states rests upon oral tradition, but there are Arab chronicles beginning with that of Ibn Haukal in the tenth century. The Hausa, Fulani, Bornu, and Wadai empires, though they may have just touched on French West Africa, are part of the history of other territories.

The Empire of Ghana

Local traditions ascribe the founding of a state of Semitic origin in the region of Aoukar to the fourth century A.D., and state that by 790 a line of forty-four 'white' sovereigns had ruled over it. These may have been Jews, for it is certain that they were numerous in north Africa during the ninth century, and held in their hands a great part of its commerce. The title of these 'white' sovereigns was Ghana, and their capital was Koumbi (later called Ghana), between Goumbou and Oualata (Walata). Dates are rather uncertain, but one tradition has it that in A.D. 837 Boulatan Ben Tiklan, the last of this line, was converted to Islam, and was overthrown by a pagan Sarakollé, or Soninké, of the Sissé family.

Sarakollé Dynasty. This family had been vassals of, and was related to, its predecessors, but with a very strong admixture of negro blood. It was under the Sarakollé dynasty that the power of Ghana reached its zenith, about A.D. 1000. We are told by the Arab chronicler Bekri of the eleventh century that Ghana was the largest and wealthiest town of the negro countries. It was divided into two distinct towns joined by an avenue of stone houses: the one quarter inhabited by Moslems in which there were twelve mosques, the other by non-Moslems. The kings lived in great state, and were buried in their full regalia, whilst a wooden cupola, over which earth was piled high, covered their tombs. A town, which may well have been Ghana from its situation and ruins, was excavated by the French explorer Bonnel de Mézières in 1914. To the west, Aoudaghost, the capital of the southern Berbers, paid tribute. The kings of Ghana drew gold from the mines of the Falémé basin and Bambouk, which lay 400 miles to the south-west. Eastward their empire extended almost to the lakes near Timbuktu. Its westward limits are marked by a line running north to the present frontier of Rio de Oro. Its fame was known in Cairo and Baghdad. The country round Ghana was undoubtedly better watered in the tenth century than it is to-day, for Bekri speaks of vast and prosperous fields, whereas now it is an arid tract traversed only by nomads. Local tradition ascribes the decline of Ghana to the change in climate at least as much as to the Almoravid, or Marabout, movement, which we must now consider.

Marabouts and Almoravids

Mention has been made of Aoudaghost, the capital of a strong Sanhaja community of Berber tribes, and a link on the trade route between Ghana and Sijilmassa, that storm centre of fanatical Mohamedanism in Moroccan Tafilelt. Early in the eleventh century one Yahia ibn Ibrahim, a chief of the southern Berbers, returned from a pilgrimage to Mecca through Morocco, and brought back with him, from Sijilmassa, Ibn Yacin, as Moslem missionary to his own people. The austereies of Islam have seldom recommended themselves to the Berbers, as a people, unless accompanied by conquest and loot. For a time Ibn Yacin was cast out, but, in the end, his fervent piety, and his promised Jihad, won the day. After a chequered beginning of conquest, starting in 1042, sometimes deserted because of his harsh discipline, sometimes advancing with growing strength, Ibn Yacin took and sacked Aoudaghost in 1054. His followers were known as Marabouts, or 'those who shut them-

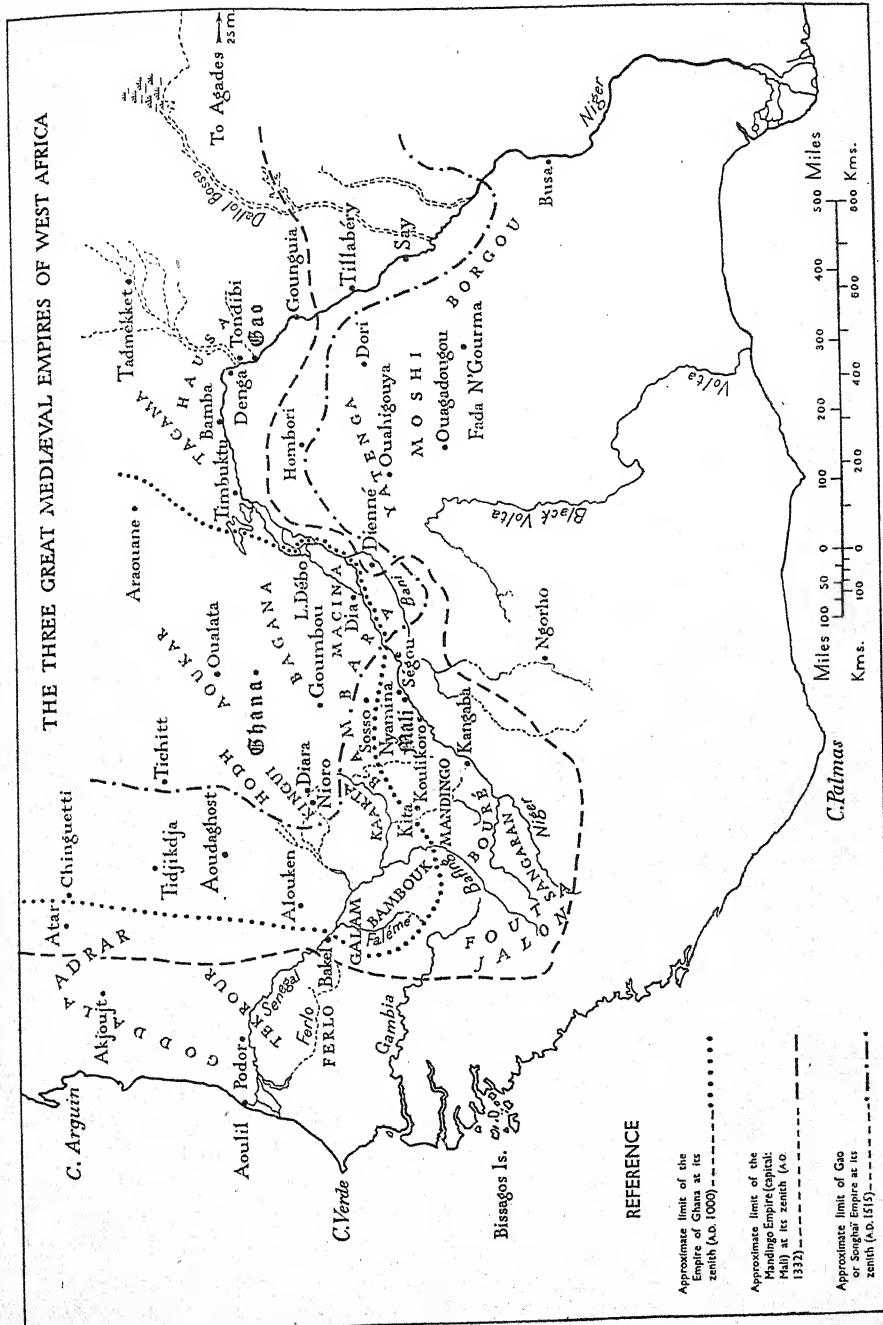


FIG. 45. *The Three Great Medieval Empires of West Africa*

selves up in a monastery', but are perhaps better known as Almoravids (or 'the Marabouts'). Ibn Yacin next made a dash north to right the wrongs of the oppressed people of the Draa and then, called northwards for the second time, launched that swift and brilliant campaign of conquest which, now under Yusuf ben Tashfin, spread the Almoravid Empire from the Senegal to Castile; a campaign which is briefly described in the companion volume on Morocco (B.R. 506). By 1062 Abu Bekr, the uncle of Yusuf ben Tashfin, was gathering together what remained of the Almoravids in Adrar. Helped by the King of Tekrour (see Fig. 45) Abu Bekr took, and sacked, the capital of Ghana in 1076, giving the inhabitants the choice between Islam or the sword. Thereafter the empire of Ghana gradually fell to pieces, and tributary states reasserted their independence. Meanwhile the Almoravids, too, broke up. In Morocco they gave place to Almohads, and in the Sahara the Berbers, true to tradition, fell back into their normal inter-tribal feuds and wars.

End of the Ghana Empire

The Almoravids delivered a mortal blow to Ghana, because its continued paganism, and its wealth, were a twin challenge to Moslem supremacy. But Ghana lingered on for nearly two centuries, greatly reduced in territory and prestige. One of its erstwhile tributaries, Sumanguru, King of Sosso (midway between Goumbou and Bamako), captured Ghana itself, and then had the hardihood to turn his arms against the growing Mandingo Empire, which paid him tribute, for a short time, in the early thirteenth century. However, in 1235 the Mandingo Sundiata killed Sumanguru and annexed his state, and in 1240 completely destroyed Ghana.

The Mandingo Empire

By most French writers this is known as the Mali Empire, after its thirteenth-century capital—the town Mali on the left bank of the Niger. Variants are Melli, Mellé, Mandi, Mandé, or Malinké. To Englishmen the descendants of this ruling race of the Middle Ages are invariably known as the Mandingos, and that term will be employed here.

The traditions of the Mandingo family of Keïta go back to the seventh century, when their earliest ancestor was a petty chief residing at Kangaba on the Niger above Bamako. His descendants provide petty chiefs at Bamako to-day. In the interim this family, whose line

has only once been interrupted by a usurper, and that only between 1285 and 1300, has held perhaps the greatest negro empire the world has seen.

For several centuries the Mandingo kings led an unobtrusive existence at Kangaba, but about 1050 the reigning monarch, whose name was Baramendana, was converted to Islam by a Marabout (though the bulk of his people remained pagan) and threw off the suzerainty of the declining empire of Ghana. At this time, too, the gold-mines of Bouré (Bitu of the Arab authors) came into prominence, and brought their Mandingo owners riches and contact with the outside world. Musakeïta (1200–1218) must have acquired merit by his three (or some say four) pilgrimages to Mecca, and must have had no small resources to have accomplished these journeys in a manner befitting his rank.

It has been related already how, on the fall of Ghana, Sumanguru, the Sosso king, imposed tribute on the Mandingos, but Sundiata (1230–1255) threw off the yoke, killed Sumanguru, and finally annexed what remained of Ghana. He then moved his capital to the newly built Mali on the Niger between Nyamina and Koulikoro. Not only was Sundiata a conqueror, but he did much to develop agriculture, clearing the forest round his new capital. He also introduced cotton and weaving. In his latter years absolute security prevailed throughout his dominion. Under his successors, including the one usurper Sakura (1285–1300), a serf of the royal family, who, however, rose fully to the responsibilities and glories of his position, the Mandingo Empire extended its boundaries. Under Kankan Musa (1307–1332), after Sundiata the most famous of his line, Gao (though lost soon after his death) and Timbuktu were added to the Mandingo dominions, which reached their widest extent in his reign. At his death his empire stretched from Tekrour in the west and the forest belt in the south to Agades and Tadmekket on the north and east. Its boundaries followed roughly the course of the Niger at varying distances from its right bank, omitting Dienné and leaving the Moshi their independence. Though shortly after his death Gao recovered partial independence and the Moshi sacked Timbuktu, the prestige of the Mandingos seems to have suffered little diminution under Musa's brother Suleiman (1336–1359). His power extended over the entire Sahara, and all the Tuareg paid him tribute. With the Sultan of Morocco he exchanged ambassadors as with an equal. Ibn Batuta, who visited Mali on an embassy from Morocco in 1352, has testified to the excellent administration of his empire,

its sound finance, its justice and security, and the magnificence of its sovereign's court.

After his reign decline set in. Musa II (1374-1387) had no success in his war against Bornu, and the fifteenth century is a confused story of defeat at the hands of Gao and the Moshi Empire of Yatenga, though, in its closing years, the Mandingo emperor was still of sufficient account to exchange embassies with the Portuguese on the lower Gambia. In the sixteenth century, pressed on the west by the Fulani of Tekrour and on the east by the Askia dynasty of Gao, the empire was gradually driven back to its boundaries prior to Sundiata's reign. For some time in 1545 Gao armies occupied Mali itself. About 1660 the last Mandingo emperor, Mama Maghan, was forced to abandon Mali by the Bambaras of Ségou, who hated Islam, and retired to Kangaba, the cradle of his race, where his descendants, for long the chiefs of the petty canton of Mandé, have now little political significance. The site of Mali has long reverted to bush.

The Gao or Songhai Empire

At the end of the seventh century Berbers from Tripoli, possibly Christians, established themselves as fishermen at Gounguia on an island about 100 miles down the Niger from Gao.

Dia Dynasty. From their founder, Dia Aliamen, the dynasty took the name of Dia, and about A.D. 1010 Dia Kossoi was converted to Islam, though outside his immediate entourage that faith made little progress. About the same time the capital was moved to Gao, which had been founded contemporaneously with Gounguia. The inhabitants of Gao were known as Songhai, and the empire took its name from them. In the eleventh century Gao became an important market on the caravan route from Tripoli.

Bekri, in the eleventh century, tells us that the town was divided into two quarters, one for the Moslems where the merchants from the Sahara stayed, and the other for the infidels, where curiously enough the emperor lived, though himself a Moslem. At the end of the twelfth century this empire extended along the Niger valley from the Dallol Maouri in the south to Bamba in the north, and, towards the end of the thirteenth century, had reached Lake Débo, though here it was under the suzerainty of Mandingo.

In 1325 Kankan Musa took Gao, and the whole of the Songhai state became tributary to Mandingo, the two sons of Dia Assibai being carried off as hostages. In 1335 they escaped, and the elder, Ali Kolen, seized the throne and took the title of Sonni.

The Sonni Dynasty. Though but a prolongation of the Dia dynasty, Ali Kolen and his eighteen successors, who reigned till 1493, are known as the Sonni dynasty. The founder shook off the Mandingo suzerainty, but we hear little more of Songhaï extension till Ali Ber, or Ali the Great, captured Timbuktu in 1468 from the Tuareg, who had taken it from the Mandingos in 1433. Then, after a siege of seven years, he took Dienné, treating the vanquished king with respect, but laying waste the country between that place and Timbuktu. In 1483 he drove back a bold attack by Nassere, the Moshi Emperor of Yatenga. He remained for the rest of his life in Timbuktu, where he died on 16 November 1492.

To the brilliant qualities of a conqueror Ali the Great joined a reputation for cruelty, licentiousness, injustice, and impiety. His son Bakari Daa was overthrown early in 1493 by Mohammed Touré, one of his father's officers, and the 'Berber' dynasty came to an end after an existence of eight centuries.

The Askia Dynasty (1493–1591). The Askia dynasty founded by Mohammed I lasted from 1493 to 1591. This emperor was an excellent administrator, encouraging religion, letters, and the arts in the schools of Timbuktu, Gao, Oualata, and Dienné. Picking his men well, he was ably seconded by his principal lieutenants, notably by his brother Omar. Giving up the Sonni system of mass levies, he formed a professional army of slaves and prisoners of war, and thus set free the bulk of his population for agriculture and trade. His wars between 1497 and 1513 included an expedition against the Yatengas, from whom he took numerous captives (1497–1498), though he failed to subdue their country, a campaign in the region of Tillabéry which he annexed (1499–1500), and an expedition on the Niger below Say in 1504–5. In 1513–1515 he took Katsina and imposed his suzerainty on Agades. From the decaying Mandingo Empire he tore the Bagana country in 1498–1499, the kingdom of Nioro in 1500–1, and by 1512 he had pushed on as far as Bakel on the Senegal, but his permanent dominion probably never extended so far to the west. His reign saw the zenith of the Songhaï power, and his enforced abdication, when blind, in favour of one of his sons, was the signal for internal strife and the ultimate disintegration of the empire. He died in 1531.

End of the Songhaï Empire, 1591

The final blow was dealt by the Saadian Sultans of Morocco. Europeans had been driven from that land, and the Sultan Abu el

Abbas el Mansur turned his attention to the gold and salt of the Sudan. In 1578 he purchased the right to exploit the salt of Taoudenni from the Songhai Emperor Daoud. After the death of Daoud he sent a large army to occupy the salt-beds, but it melted away from hunger and thirst. In 1590 he dispatched what was, for those times, a really up-to-date expedition. The cavalry and infantry, 2,500 in all and mostly European, were armed with the harquebus. The Moorish contingent of 1,500 lancers, and six large cannon, with ammunition acquired from England, completed the fighting troops. An adequate supply and transport column was added and the whole was under the command of an Andalusian eunuch called Juder. That so large an expedition could cross the Sahara is a tribute, not only to the command, but to the condition and upkeep of the wells, at that time, upon the desert routes. Nevertheless the overconfidence of Isshak II, the then Songhai Emperor, proved to be the decisive factor. Wells were left open, Juder reached the Niger, and though he had probably lost many men in the desert, he had enough on 12 April 1591 to sweep the Songhai bow- and spear-men from the field of battle at Tondibi, 30 miles north of Gao. The inhabitants of Gao fled, but the population of Timbuktu remained, though Juder occupied it in May 1591.

The wealth of the conquered country, and the booty which reached Morocco, earned El Mansur the nickname of Ed Dehebi (the golden). Moorish troops were eventually withdrawn in 1618, but the Songhai Empire fell rapidly to pieces.

For Timbuktu three hundred years of anarchy set in, at first under Pashas nominally appointed by Morocco, then under a series of petty tyrants paying tribute to the Bambaras, the Tuareg, the Fulani, or whoever might for the moment have the upper hand. This state of affairs lasted till 9 February 1894, when Major Joseph Jacques Césaire Joffre occupied the town in the name of France.

The Moshi Empires

It remains to deal briefly with the Moshi (Mossi) Empires. These have played lesser parts than the three whose history has been already sketched, but they are all worthy of notice, in that they have had an unbroken, and on the whole peaceful, existence for many centuries. Till the coming of the French they have never submitted to a conqueror; they developed workable constitutions, and, curiously enough, they have throughout presented an insuperable barrier to Islam, though they may have had many foreign Moslems among them.

The three dynasties were founded by the three sons of Widirago, who was the son of Poko, the lovely daughter of the King of Dagomba, who fled from her father's court at Gambaga because he neglected to provide her with a husband. At his death his three sons divided his empire among them.

Ouagadougou. The senior empire, that of Ouagadougou, whose chief is the Morho-Naba, has a complete line of sovereigns from the eleventh century to our own times, and had a highly organized constitution. The emperor had five provinces directly under him, and was the suzerain of four vassal kingdoms. He was assisted by sixteen dignitaries, of whom five were the provincial governors: the others occupying various offices. The Prime Minister was the guardian of the Royal Tombs, the second was the master of the horse, the junior the chief of the Moslems. The sons of the emperor were forbidden to reside in the capital, but elsewhere might pillage or even murder at their will. His daughters, married or single, might bestow their favours as they pleased. At the death of an emperor his successor was chosen from the family by the council. Till this proclamation there was absolute anarchy. The constitutions of the other two empires were similar.

Yatenga, lying to the north of Ouagadougou, was of lesser extent. Its capital was at Ouahigouya. Many of the emperors were famous warriors, and we have already touched upon their exploits.

Fada N'Gourma was to the east of Ouagadougou, and though it boasts a list of twenty-four sovereigns, coming down from the eleventh century to our own day, it has no very outstanding history.

From the foregoing it is plain that in the Middle Ages African negroes were capable of creating, and maintaining through long periods, large states, the efficiency of whose government would bear comparison with that of many contemporary European states. It is well to stress this fact, which many are apt to overlook.

Negro States after 1591

It is not intended to do more than mention the most important of various kingdoms into which the Songhāi Empire split. Though some of them lasted for as much as two centuries, none of them held secure or extended dominion for any great length of time, and none of them had the traditions of the three earlier empires we have described. There was the Fulani Denianké dynasty, whose territories were north of the Senegal near Nioro, and which lasted from about 1559 to 1776. There were the two kindred Bambara kingdoms of Ségou and

Kaarta, the first with its capital at Ségou lasting from 1660 to 1861, the second, farther to the west, known also as Masari, lasting from 1660 to 1854. There were the Fulani of Macina, who, under the Marabout Seku Hamadu, shook off the suzerainty of the Bambaras, captured Dienné, and then Timbuktu, but were extinguished in 1862 by the Toucouleur El Hadj Omar.

EARLY EUROPEAN CONTACTS

Portuguese

Though the French claim to have colonized the Canary islands first, in the early fifteenth century, there is no doubt that the honour of rediscovering the west coast of Africa belongs to the Portuguese under the inspiration of Prince Henry the Navigator, who died in 1460. His captains first rounded Cape Bojador in 1434, and in 1441 a Papal Bull reserved to the Portuguese exclusive rights of dominion on the west coast of Africa. In 1443 Nuno Tristam reached Arguin island and brought home slaves. He perished at the hands of the natives at the mouth of the Gambia in 1446. The Senegal river and Cape Verde were reached in 1445 by another Portuguese, Dinis Diaz, and the Gambia was explored in 1455 and 1456 by a Venetian in Prince Henry's employ, Cadamosto, who has left an account of his voyages. Sierra Leone was reached in 1461 or 1462 again by a Portuguese, Pedro da Cintra, who sailed on to Cape Mesurado near the modern Monrovia.

In 1469 King Alfonso, nephew of Prince Henry, granted Fernando Gomez a monopoly of traffic down the African coast for five years, on condition that each year he explored 300 miles farther on from Sierra Leone. Within two years the Portuguese flag had been carried across the equator, and, with the discovery of the Congo by Diego Cam in 1484, Portuguese exploration of the West African seaboard may be considered complete.

English

The Papal Bull of 1441 was officially respected till the Reformation, although adventurous individuals were not so scrupulous. In 1481 King Edward IV prohibited an English expedition from sailing to Guinea, in deference to the remonstrances of King John of Portugal.

The first English voyage recorded is that of 'old Mr. William Hawkins' in 1530-1532, who, on his way to Brazil, touched at the river of Sestos (Liberia) to purchase 'elephants teeth and other commodities which

that place yieldeth'. Unlike his more famous son Sir John, he did not deal in slaves. But from 1550 English voyages to the coast became common.

Spanish

In 1493 Columbus returned after discovering the Antilles. Columbus was in the service of King Ferdinand of Spain, and King John of Portugal immediately set on foot an expedition in the conviction that these islands, not far distant from the Azores, rightly belonged to him. Meanwhile, Ferdinand secured a Papal Bull (1493) allotting to Spain all lands more than 100 leagues west and south of a line from the Azores to the Cape Verde islands. This looked like checkmate, but John succeeded in getting Ferdinand to agree, by the Treaty of Tordesillas (1494), to a line drawn 370 leagues west of Cape Verde islands. The exact point from which the leagues were to be measured, the exact length of a league, and the position of the corresponding meridian on the other side of the world, were not specified. Trouble was to come later. Meanwhile, Spanish activities were devoted to the far west, while John, who seems to have known of the existence of Brazil, secured possession of it, and unhampered opportunity in Africa. Other nations could not be expected to agree to these monopolies, especially after the Reformation. By the time of Queen Elizabeth, English, French, and Dutch were busy wresting this or that settlement, on the coasts of the bight, from each other and from the Portuguese.

Danish

The Danes had Christiansborg Castle (now Government House) in Accra, and minor posts to the east, from about 1640 till 1850, when they passed to the British by purchase. They also had a fort near Cape Coast Castle for a few years in the seventeenth century.

German

In 1682 the Brandenburgers built a fort near Cape Three Points in the Gold Coast, and probably also had a fort for a short time on Arguin island. The first was sold to the Dutch about 1720, the other was abandoned, and for another 150 years we hear no more of the Germans in West Africa.

Dutch

The first Dutch voyage recorded is in 1595, when Bernard Ericks
A 2770

made a voyage to the Gold Coast. In 1637 they captured Elmina and in 1642 Axim, both at the expense of the Portuguese. They also had a fort at Arguin, which island was occupied successively, or simultaneously, by Portuguese, Dutch, English, and French. In 1727 the Dutch ceded their claims to the French, to whom, except for the vicissitudes of the wars of the eighteenth and early nineteenth centuries, it has belonged ever since. In 1617 the Dutch bought Goree from the natives. Taken by the English in 1663, it was retaken by De Ruyter the following year. It was taken by the French under Admiral D'Estrées in 1677, and confirmed to them by the Peace of Nimeguen in 1678. Its subsequent history is similar to that of Arguin. After they took Elmina the main activity of the Dutch was confined to the Gold Coast, but all their possessions there passed to the British in 1783.

French

The French had been earlier. Louis XI sent an expedition to Cape Verde in 1483 to search for a remedy for the leprosy from which he died before its return. This is the first authenticated French expedition, but in the next fifty years the French flag, carried by mariners of Dieppe and St. Malo, was to become as common on the west coast as the Portuguese or English. In 1558 the *Bonne Aventure* and the *Gallaire* entered the river Senegal and anchored off the site of St. Louis, and from that day till now Senegal has been the centre of French West African colonization.

RICHELIEU TO THE PEACE OF PARIS, 1814

Privileged Companies

Both in France and elsewhere the object of the pioneers was trade, not dominion, which was, however, gradually and inevitably assumed for the security of that trade. It was therefore natural that development should be in the hands of private companies. In England, in 1588, Queen Elizabeth, as though she had not enough maritime adventures on her hands for one year, granted to the merchants of Exeter a charter to trade to Senegal and the Gambia. In 1618 King James I granted a charter to the 'Company of Adventurers of London trading into Africa' who founded the earliest English settlements on the west coast: Fort James on the Gambia and Cormantine on the Gold Coast.

In France the first of such companies (the Norman Company) was

founded in 1624 with a charter to trade to Senegal and the Gambia. It lost no time in coming into collision with the English, from whom its captain took a vessel carrying slaves and other cargo at the mouth of the Senegal in 1628. In 1634 Richelieu granted the Norman Company exclusive trading rights for ten years to Senegal, Cape Verde, and the Gambia. In 1634 he granted a similar monopoly to the St. Malo Company, to trade from Sierra Leone to Cape Lopez, while in 1635 the 'Parisian' Company obtained a monopoly, for thirty years, along the coast between Cape Blanco and Senegal to the north, and between the Gambia and Sierra Leone to the south of the Norman Company's territory. Thus the whole coast from Lévrier bay southwards, eastwards, and southwards again as far as to the mouth of the Congo was partitioned among three French companies. The first Christian mission was founded at Rufisque by Père Alexis, a Capuchin, in 1635.

In 1638 the first permanent French settlement was founded 3 miles up the river Senegal, and Captains Lambert and Jeannequin explored it as far up as Podor, making treaties of commerce and friendship with the kings of Caylor and Oualo. In 1659, the previous settlement having been swept away by a storm, the present town of St. Louis was founded.

We learn that the possessions of the Compagnie du Sénégal, as the Norman Company had now become, consisted in 1679 of Arguin in Mauritania, St. Louis, Goree, Rufisque, Joal, Portudal in Senegal, Albreda on the Gambia, Ouidah, Savi, Porto Novo, and Badagri on the Slave Coast, and perhaps one or two minor posts along the coast of Guinea. The company undertook to furnish 2,000 slaves yearly to the French possessions in America, and to provide them for the galleys. From now onwards there were frequent changes, which it would be tedious to notice, in the names, constitutions, and territories of the various companies. There was continuous war with Holland and England. Arguin was lost to the Dutch in 1693, St. Louis and Goree—shuttlecocks for the next hundred years—to the English, while in 1695 the French took the English Fort James, Gambia. The Peace of Ryswick in 1697 restored it to England, while prior to that St. Louis and Goree had been retaken by the French.

When war broke out again in 1701 the English Governor Corker and the Frenchman André Brue agreed on a local peace, which appears, however, to have been confined to the immediate vicinity of the Gambia, and to the duly authorized agents of the two companies, for in 1709 French freebooters captured James island and seized a

number of slaves destined for the British American colonies. This local truce was tried on more than one occasion subsequently. It was kept honourably on both sides by the companies, but neither king's forces would recognize it.

In 1700 the Nouvelle Compagnie du Sénégal was exporting 1,000 slaves, 40,000 skins of cattle, 150,000 pounds of ivory, 250,000 of gum, 100,000 of wax. Other exports were gold and ostrich feathers. They gave in exchange spirits, fire-arms and ammunition, cloth, cutlery, pewter, copper pots, musical instruments, and beads; much the same varied assortment as their successors are supplying 250 years later.

The Slave Trade

The mention of slaves naturally leads to the slave trade, which may conveniently be disposed of here. It began when Prince Henry first brought slaves to Portugal, and by the year 1539 some 10,000 negroes are said to have been sold annually in the Lisbon market. In the course of the next hundred years, with the opening of America to European enterprise, there was a large demand for slave labour, and all nations took their part in it. Slave raiding in the interior was not undertaken directly by Europeans—indeed Prince Henry expressly forbade it—but they purchased from the coast tribes the victims of their forays into the interior and also their own criminals. Though the whole coast was tapped, raiding went deepest into the interior between St. Louis and Monrovia, Dahomey and the Congo. It is estimated that in the last half of the eighteenth century the total number annually exported from the west coast was about 100,000. In 1787 the English were credited with 38,000, the French with 31,000, the Portuguese 25,000, the Dutch 4,000, and the Danes 2,000. The Spaniards, loyal to the Papal ruling, kept out of the trade and relied on others: and, by the Peace of Utrecht in 1713, the supposedly profitable contract (the Assiento) for the supply of slaves to the Spanish West Indies was taken from the French by the English. It proved, however, to be anything but lucrative to the Royal African Company. In 1739 the company owed a large sum to the King of Spain, and in 1750 the contract was abandoned.

The slave trade was abolished by Denmark in 1792, by Great Britain in 1807, by Holland in 1814, by Sweden in 1815, by France finally in 1818, and by Portugal in 1836. But its suppression, in fact as well as in law, gave cruisers of several nations work for many years to come.

André Brue

André Brue, on behalf of the Nouvelle Compagnie du Sénégal, was not content to keep to the coastline. By agreement with the chiefs in 1698 he built a fortified post of St. Joseph on the banks of the Senegal near Ambidédi, thus carrying the French flag nearly 400 miles up the river. Though this post was destroyed by the natives in 1702, it was the first instance of an attempt by a European nation to establish a permanent station away from the coast. Brue also obtained rights on the island of Bolama. He retired to France in 1702 after six years in Senegal, but in 1714 returned and remained, till 1720, as director-general in Africa. During this term he sent parties to explore the upper Senegal and the Falémé, visiting the gold-mines of Bambouk, where his directors refused to allow him to establish posts. This indomitable old man made a third short visit to Senegal at the age of 70, in 1723, as 'Commissaire Général'. He wished to attack the Dutch at Arguin and Portendick, but was unable to persuade the king's officers to fall in with his project.

The Seven Years' War

During the Seven Years' War (1756–1763) St. Louis, Goree, and Albreda again fell into British hands, and French garrisons at Podor and in Galam were withdrawn. Company rule lasted nominally till 1763, at which time all French establishments were in British hands. In that year the Peace of Paris restored to France Goree, Joal, Portudal, and Albreda. On the recovery of the colony so constituted, a governor was appointed by the Crown, and his headquarters were at Goree. St. Louis was kept by the British in 1763 for the sake of its valuable trade in gum, but in the next war it was retaken by the French in 1779. Though at the Peace of Versailles in 1783 the British retained certain trading rights in gum, all territorial possessions were restored, and the Colony of Senegal, and its dependencies, was thenceforward administered by a governor appointed by the king, to whom alone he was responsible. But the monopoly of the last trading company—the Nouvelle Compagnie du Sénégal—was not abolished till 1791, when the Constituent Assembly declared that trade throughout the colony should be free to all Frenchmen.

The end of the Revolutionary Wars left Senegal again in British hands, but as in their previous occupation they did not attempt to bring the country within the British system. Thus the French mayor of St. Louis was not only retained in his office, but on his death in 1802 was succeeded by another Frenchman. This is rather

surprising, as several British explorers had visited the interior during the period. Their journeys will be touched on shortly.

Farther along the coast, in Benin territory, a post was established but was destroyed by the British in 1792, and never again occupied.

Treaty of Paris, 1814

The Treaty of Paris, signed on 30 May 1814, and not disturbed after the interlude of the Hundred Days, marked the end of the last great struggle between France and England, and restored to France her West African possessions as they existed on 1 January 1792. The British, however, though prohibited from forming permanent settlements, reserved trading rights in gum along the coast between Portendick and Arguin bay. This irritant to the French lasted till 1857, when it was abandoned in exchange for the French counter-irritant, the fort of Albreda in the Gambia river. With these reservations the French possessions along the coast were Arguin, Portendick, St. Louis, Goree and its dependencies, Cape Verde, Rufisque, Portudal, and Joal. The British, too, were not concerned to interfere with the rights which the French had obtained by treaty with the natives up the Senegal, so that France was the only European Power which, at that time, had any claims whatsoever inland. Concurrently with the British and Portuguese the French kept rights which they had acquired on the Gambia (till 1857) and Casamance rivers, as also at Cacheo, Bissau, Bolama, the Bissagos archipelago, and the Los islands. Gambia island, Sierra Leone, had been abandoned in 1793 and was not now claimed by the French. Such shadowy claims as they had in the Ivory Coast and Dahomey were untouched, though only at Ouidah had they any effective occupation. At this time England had settlements in the Gambia, Sierra Leone, and the Gold Coast, whilst also occupying the Los islands. The Gambia settlements included Bathurst, founded in 1816, Fort James, and a strip of a mile wide, known as the 'ceded mile', on the north bank of the river. In Sierra Leone England had had a factory since 1660. The 20 square miles on the present site of Freetown were ceded in 1788, and in 1792 the colony of freed slaves was founded there. British settlements in the Gold Coast lay to the east of Cape Coast, their headquarters at that time. The Dutch, with headquarters at Elmina, held most of the forts to the west.

Liberia

Though it may involve some departure from chronological

sequence, it is well to give here a brief account of the origin of the negro republic of Liberia. In 1821 Cape Mesurado was selected by the American Colonization Society as the site for a settlement of freed American negroes. This colony (now Monrovia) grew under a white American, Jehudi Ashmun. He was joined in 1824 by the Rev. Robert Gurley, who invented the name Liberia. Other detached colonies of similar origin sprang up along the coast, and in 1833 the 'independent African State of Maryland' was founded at Cape Palmas. The early years of all these settlements were spent under the aegis of the American Society, and usually under white governors, but in 1847, at the suggestion of the society, the 3,000 negroes of Liberia, then headed by an octoroon, Joseph Jenkins Roberts, devised a constitution on American lines, and proclaimed their independence. Roberts was elected first President of the Republic, and held office till 1856. The new state was recognized by most of the Powers in the two following years, but, strangely, not by the United States till 1862. Maryland was absorbed in Liberia in 1857.

For many years Liberia tried to develop on national lines and to co-operate with the native tribes, but the latter had no wish for co-operation, so the Government, with difficulty, controlled the coastline, and was ignored 20 miles inland. This state of affairs lasted till the time of President Barclay, elected in 1904, who instituted the present policy of development by means of loans and concessions, which involved some supervision first by European and then, and increasingly, by American advisers. But as late as 1925, when a large rubber concession was granted to the American firm of Firestone, it could still be said that, in spite of all the efforts of Barclay and his successors, the hinterland of Liberia was the least known region of tropical Africa, and the one in which the authority of the Government was most nominal. In that year it was estimated that the Americo-Liberians did not number more than 25,000, of whom half lived in the capital, Monrovia.

EXPLORATION IN THE INTERIOR TO 1850 (FIG. 46)

Before taking up the history of French colonization after the Napoleonic Wars, a brief account of the journeys of the principal explorers must be given.

We have seen that in the early eighteenth century Brue's officers penetrated to Bambouk. Pierre David went more than 200 miles up the Falémé in 1744 in search of minerals, and built a post, the remains of which, with some guns, were found by Faidherbe in 1858.

Houghton, 1791

Major Houghton set out to discover the Niger from the Gambia. Leaving the river at Medina¹ he crossed the Falémé and the Senegal, but died in 1791 at Jarra near Dianghirté, some 200 miles north-west of Ségou. Mungo Park, who followed him in 1795, was unable to determine whether he was murdered or died of starvation.

Mungo Park, 1795-1805

Mungo Park himself followed the same route. Leaving Medina¹ on 5 December 1795 he was at Kayes on the 24th, and after many adventures reached the Niger, on 21 July 1796, at Ségou, then the capital of Bambara. He then followed the Niger 80 miles down stream to Silla where, exhausted and without means, he was obliged to turn back. He followed the course of the Niger for 300 miles to Bamako, going thence across country to the British trading station of Pisania on the Gambia, which he reached on 10 June 1797.

On his second and last journey Park was joined at Goree by Lieutenant Martyn, thirty-five privates, and two seamen. Leaving the Gambia in May 1805, and travelling by the same route as before, the eleven surviving Europeans reached the Niger at Bamako in the middle of August. Thence the journey was made by river, and Park's last letter is dated 27 November. In it he stated his intention of stopping nowhere till he reached the river-mouth. These letters were sent by his Mandingo guide, Isaaco, who was engaged by the British Government in 1810 to return to the Niger and ascertain his fate. The story he brought back was confirmed by the later investigations of Clapperton and Lander. He had stuck to his resolution not to stop. After journeying down stream 1,000 miles, the canoe struck a rock near Busa in November or December 1805. On the bank were hostile natives who attacked with arrows and spears. Park, Martyn, and the two surviving soldiers were drowned, and the sole survivor of the whole expedition was a slave from whom Isaaco obtained the story. Though his journals were never recovered, to Mungo Park belongs the honour of rediscovering the upper Niger in modern times.

Gaspard Mollien, 1818

Gaspard Mollien, on the instructions of the French Government, left St. Louis on 28 January 1818 disguised as a merchant and accompanied by a single Marabout. Going east and then south-east

¹ Medine or Medina is the Arabic word meaning city.

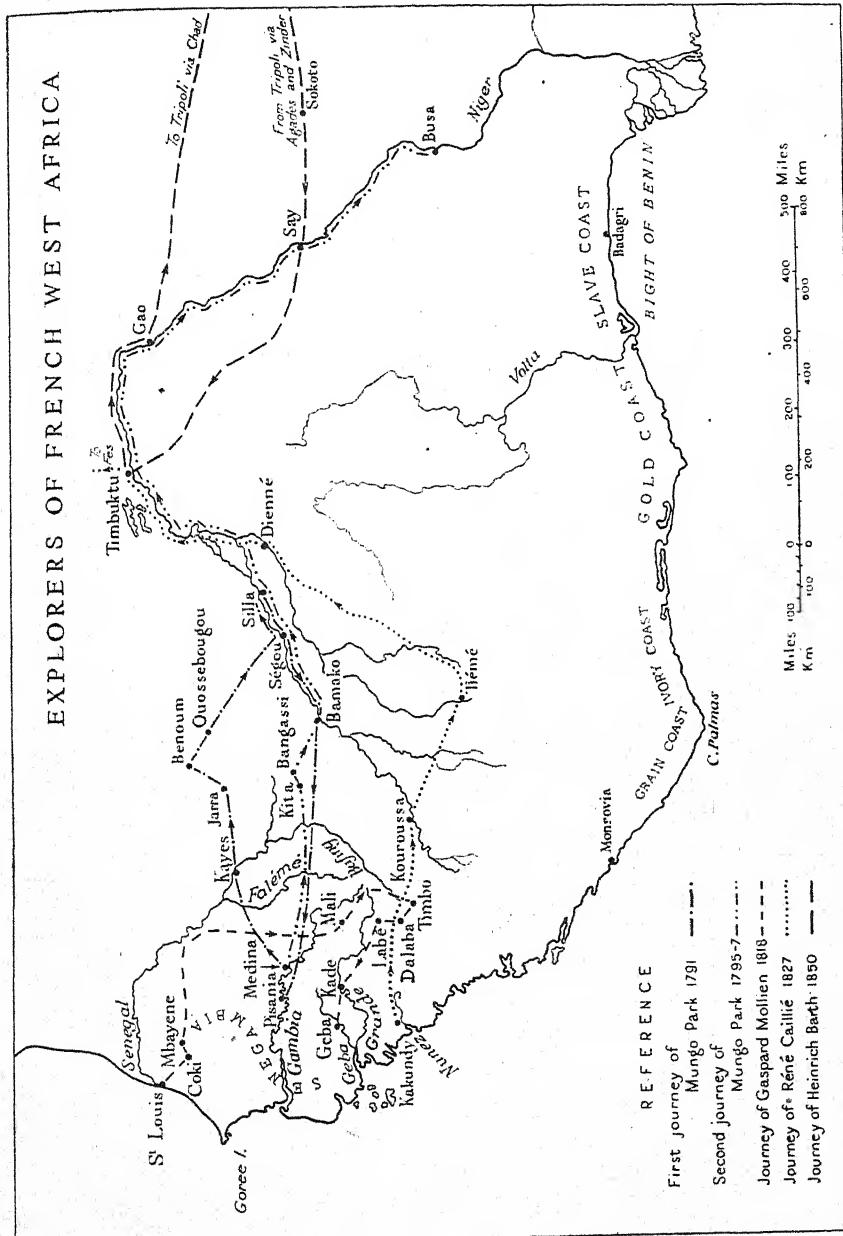


FIG. 46. Explorers of French West Africa

he visited, in April, the sources of the Gambia and the Rio Grande, barely a kilometre from each other, in Fouta Jalon. He then went on to Timbo, and on the 26th found the source of the Senegal near Dalaba. On 19 July he reached a Portuguese post on the Geba, which he descended. His was a series of most useful discoveries.

René Caillié, 1827

René Caillié, having spent some months learning native languages and picking up Mahomedan customs, joined a Mandingo caravan on 19 April 1827 at Kakundy on the Rio Nunez. On 11 June he reached the Niger at Kouroussa. Detained five months by illness at Tiémé, he arrived at Dienné in January 1828, whence he reached Timbuktu by water. After spending a fortnight there he joined another caravan and reached Fes on 12 August. He was the first European of modern times to return in safety from Timbuktu, and to publish an account of his travels. Mungo Park had passed by it, and in 1826 Major Gordon Laing had reached it from the north via Ghadames and the oasis of Touat, but both had been murdered on the return journey.

The travels of Oudney, Denham, Clapperton, and the Landers belong rather to the history of Nigeria and French Equatorial Africa, though both Clapperton in 1826 and the Landers in 1830 did cross the Niger near Busa and reach the coast at Badagri, traversing the extreme eastern portion of what is now Dahomey.

Heinrich Barth, 1850

Heinrich Barth left Tripoli early in 1850, as a member of an expedition sent by the British Government under James Richardson to open up commercial relations with the central and western Sudan. The death of his colleagues left Barth to carry on alone. Proceeding via Ghadames and Agades across the Sahara he reached Zinder, and, after exploring the Sokoto country, crossed the Niger at Say and then proceeded overland to Timbuktu, where he arrived in September 1853. Though not actively molested, he was not very popular, but remained there till May 1854. He returned via the Niger to Gao, thence to Chad and back to Tripoli by the eastern route to Bilma and Murzouk, arriving in Europe in September 1855. Barth, who was a scholar, published his *Travels and Discoveries* simultaneously in English and German. It is a book which still ranks as a standard work on the history, civilization, and resources of the countries of which he wrote.

THE PEACE OF PARIS TO NAPOLEON III

In 1794 the Revolutionary Convention abolished the status of slavery throughout the dominions of France, and proclaimed the right of the natives to obtain French citizenship. It did not, however, expressly abolish the slave trade, though it did away with the bonus hitherto paid to ships carrying slaves. The immediate effects in Senegal were not great, the slaves stayed with their masters, and the natives did not appreciate the full benefit of French citizenship. Moreover, the French settlements were rapidly falling into British hands.

Colonization and Trade of Senegal

The Consulate restored the status of slavery in the colonies given back to France by the Peace of Amiens, and it was not finally abolished throughout the French Empire till 1848. However, on resuming possession of Senegal the French had to restart their economy on the basis of agricultural rather than human exports. They attempted European colonization along the banks of the river, building posts along its banks up to the Galam country. Cotton was to be the principal crop, fostered by bonuses. It was not a great success, partly because the wrong type of colonist was chosen, and partly owing to labour difficulties. However, trade slowly increased: exports, which were valued at 1,593,000 francs in 1821, increased to 5,000,000 in 1837. But it was the introduction of ground-nuts in 1840 which proved a turning-point in the agricultural development of Senegal. It started with an export of 840 tons in 1842, which grew to 4,750 in 1854. This crop is now widely grown throughout French West Africa and is out and away the most valuable export of the Federation. The name of the founder of this industry, Jaubert, should not pass into oblivion.

Baron Roger

Under Baron Roger, governor from 1822 to 1827, French policy in Senegal was based on respect for native institutions, collaboration without assimilation, and agricultural development. He started an agricultural service under Richard, developed cotton growing, for which industry he brought out gins from France, introduced castor-oil, sesame, indigo, and silk worms. In 1825 there were over one million cotton trees in the plantations belonging to the State, $3\frac{1}{2}$ millions in private plantations, and 15 tons of ginned cotton were

exported from St. Louis. With his encouragement the merchants of St. Louis founded, in 1824, the Société de Galam, which opened depots far inland on the Falémé. The venture seems to have been premature, for all these posts were closed in a few years, but the society, though it failed in 1840, laid the foundation of trade with Mauritania. Baron Roger sent a mission to Bambouk to investigate the possibility of working the gold-mines, but came to the conclusion that the enterprise would not be profitable. He also attempted to develop fisheries on the coast of Arguin bay.

In 1826 the sisters of St. Joseph of Cluny, after an unsuccessful experiment in sending native girls to France for education, started two schools for them at St. Louis and one at Goree.

In 1845 the French possessions were divided into two governments, that of Senegal with headquarters at St. Louis, and the Rivières du Sud, which comprised all French settlements from Senegal to, and for a time including, Gabon, under the Admiral commanding the Naval Station with headquarters at Goree.

In 1847 the foundations of the French native army were laid by the creation of a corps of native cavalry (Spahis), while in the following year a company of infantry—the first Senegalese Tirailleurs—was enlisted from the slaves freed on the abolition of slavery.

Generally speaking, the years up to 1854 were a period of quiet consolidation, peaceful penetration, and treaties with chiefs.

FAIDHERBE

On Napoleon III's accession to power a more vigorous colonial policy was adopted. Its aims were the substitution of complete French authority for the system of treaties with chiefs, the establishment of security and the methodical penetration of the interior, where French protection was to be instituted by force if necessary. The *coutumes*, or dues payable to native chiefs, were to be gradually abolished. 'By force if necessary' has been the key to French policy in West Africa ever since, but this is not to belittle the work of civilization which has followed hard upon the heels of force. It was to carry out this programme that General Faidherbe was appointed Governor of Senegal in 1854. He had previously served there, and had won a high reputation among both chiefs and people. He remained Governor for seven years, and had a second term of two years from 1863 to 1865. To start with his forces were extremely inadequate. However, in 1855–1858 he brought the Trarza Arabs into subjection after hard fighting and annexed their country, but

gave them a duty of 3 per cent., to be collected under French supervision, on gum exported from their territory, and in the same year concluded a similar treaty with the Brakna Arabs. Both these tribes occupy country to the north of the Senegal river in what is now Mauritania.

His next step was to secure for France the safe navigation of the Senegal up to Medine, the capital of Khasso near Kayes. The readiness of Diouka Sambala, King of Khasso, to accept French protection in 1855, brought both him and the French into collision with El Hadj Omar.

El Hadj Omar (Fig. 47)

This adventurer, a Toucouleur, born near Podor in 1797, made the pilgrimage to Mecca in 1820. It was nearly twenty years before he returned, having in the meantime received the title of Khalifa for the Sudan. On his way back he stayed with El Kanémi, Sultan of Bornu, with Mohammed Bello, Toucouleur Emperor of Sokoto, and with Seku Hamadu, the Fulani King of Macina at Hamdallahi, his capital on the Bani, 170 miles E. of Ségou. In 1838 he settled in Fouta Jalon and then, as on a subsequent occasion, put before the French authorities proposals for pacifying the Sudan. These were met with some favour, though no action was taken. At this period he does not appear to have been in much favour with his co-religionists. In 1848 he settled at Dinguiraye, where he proclaimed himself sovereign and raised an army. In 1852 he subdued the Mandingos. Next year he overran Bambouk, and in 1854, under pretext of converting the pagan Bambaras, marched against the Masari and took their capital Nioro. In 1855 he called upon the Moslems of St. Louis to break with the Christians, and declared that he would force the French to pay him tribute. It was impossible after this for the French to consider him anything but an enemy, and the fort at Medine was built. Turning against Khasso with 20,000 men he besieged Medine in 1857. After a brilliant defence, during which the small French garrison under the half-caste Paul Holle suffered heavy casualties and came almost to the end of its resources, it was relieved by a column under Faidherbe in July. This was the turning-point in El Hadj Omar's career. In 1859 he attacked the French fort at Matam, where Paul Holle again opposed and repulsed him, but he captured Ségou and Hamdallahi in 1862, and put the King of Macina to death. After pillaging Timbuktu he came back to Macina, where his cruelty produced a revolt.

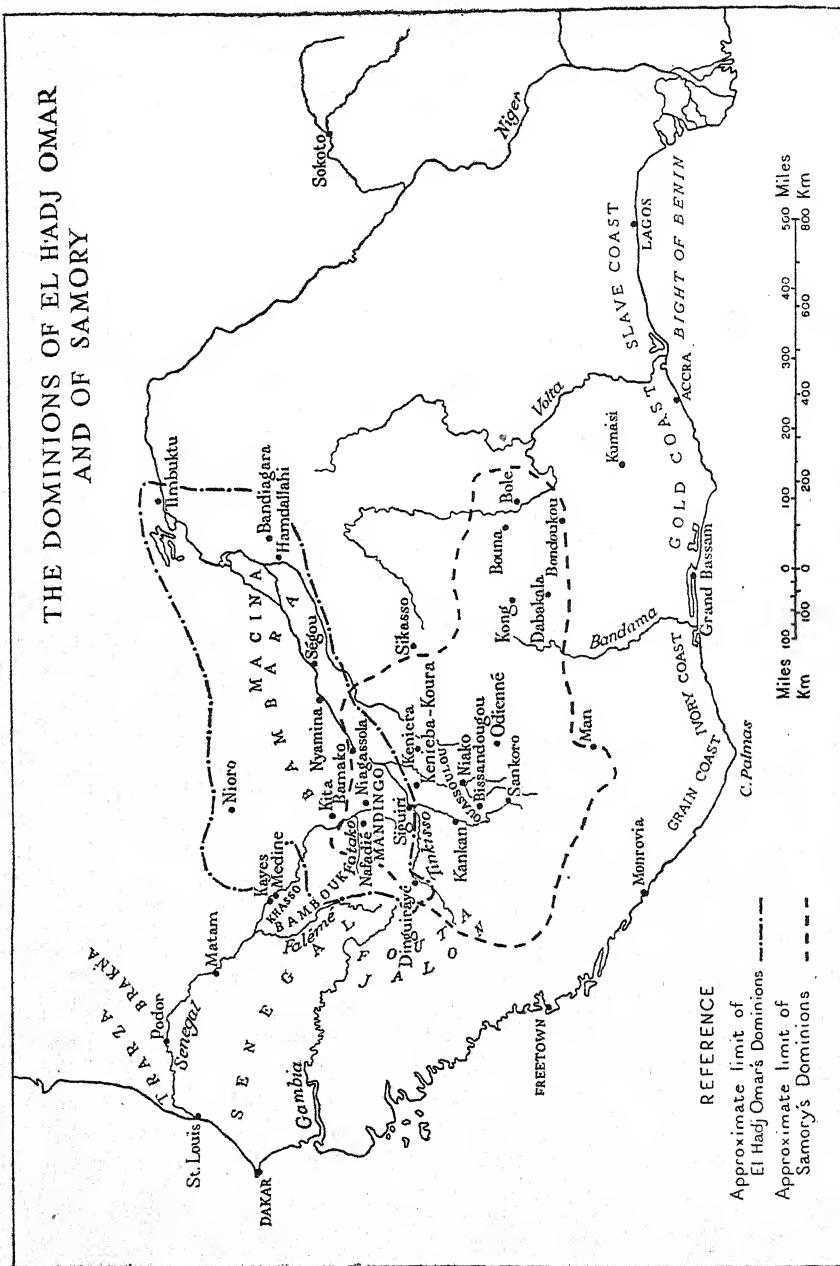


FIG. 47. *The Dominions of El Hadj Omar and of Samory*

Ahmadu

In 1863 Faidherbe sent Lieutenant Mage to get into touch with the notorious El Hadj Omar as 'the head of a new Moslem State founded by Fulani to the south-west of Timbuktu' in order to arrange for a chain of trading posts between the upper Senegal and the Niger. Accompanied by Dr. Quintin, Mage left Medine in November, and, going via Kita, reached the Niger at Nyamina in February 1864. They were well received by El Hadj Omar's son Ahmadu, who, however, declared that he had no authority to bind his father, and sent them on to Ségou, where they remained over two years. During their stay there El Hadj Omar, cornered at last by the Fulani, perished at Hamdallahi (in 1864). His death was kept secret from the French envoys. Eventually when the fact became known, Ahmadu signed a treaty which in no way satisfied the French, and Mage and his companion, who had been under surveillance though well treated, left Ségou in May 1866.

Faidherbe's Civil Work

Though fighting went on to establish French authority throughout his term of office, Faidherbe was by no means only a soldier. He looked to the future civil life of Senegal. In 1855 he founded at St. Louis the École des Otages which, reorganized in 1861 under the less sinister name of École des Fils des Chefs et des Interprètes, is still rendering valuable service on the lines implied by its title. In 1857 he opened the École Franco-Mussulman at St. Louis. In 1855 the Bank of Senegal, now developed into the Bank of West Africa, was founded. Under Faidherbe railway projects were first studied, though the earliest line from Dakar to St. Louis was not opened till 1885. He laid the foundation of a survey service, and created the *Journal Officiel de Sénégal*. In his term of office trade of the French colonies, which since their foundation had been restricted to trade with France and carried in French ships, was opened to all nations and to all flags.

Foundation of Dakar

Dakar had been ceded to France in 1764. Its neighbourhood was the scene of an unhappy experiment in agricultural colonization, part European, part native, in 1817, but it had never been effectively occupied, though a school subsidized by Government was conducted there by missionaries, and it was the headquarters of the Vicar

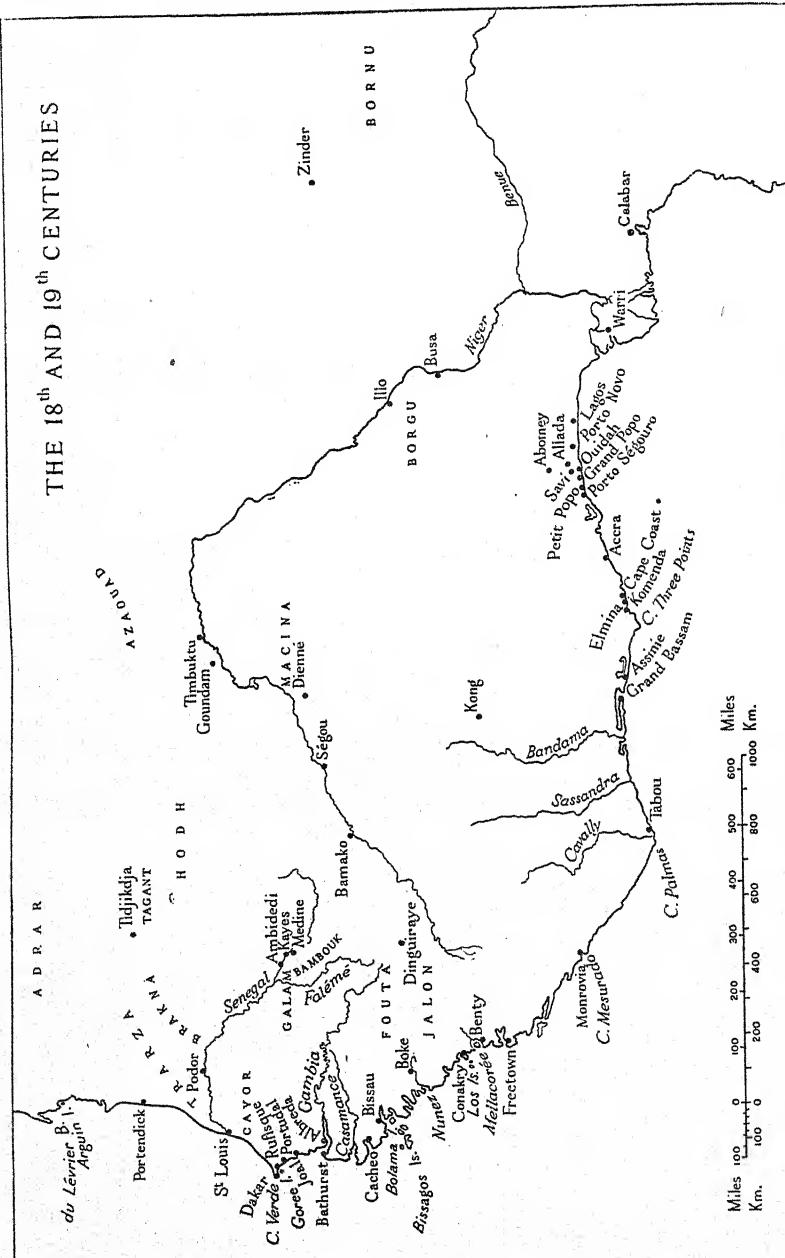


FIG. 48. *Names important in the Eighteenth and Nineteenth Centuries*

Apostolic of the Two Guineas. Faidherbe saw that the French settlement of Goree had no room for expansion. He saw also the possibilities of Dakar as a central port. The first jetty was built in 1863, and in 1866 the Messageries Impériales started calling there on their regular service between France and South America. The natives of Cayor objected to the military post established at Dakar in 1857, but Faidherbe pursued the policy of imposing French authority by force if necessary. The Damel of Cayor fled to the Gambia, but returned in 1869 and was recognized again in 1871. Trouble continued, however, till 1886, when this region was definitely annexed and divided into cantons.

Before resuming the story of military penetration we may mention that the Chambers of Commerce of St. Louis and Goree date from 1870, and their first municipal institutions from 1872, while Senegal first received representation in the French Parliament in 1871. Both St. Louis and Goree were ravaged by yellow fever in 1878 and 1881. In the first year 724 deaths took place among the European population of the colony: in the second 425, among whom was De Lanneau, the Governor.

In 1882 Servatius was the first civilian to be appointed Governor of Senegal since Baron Roger, but minor military operations went on all the decade, culminating with a serious rising under the Marabout Mahmadu Lamine on the upper Senegal. After his death in battle with Galliéni's forces in September 1887 the pacification of the colony of Senegal may be said to have been completed.

SAMORY (FIG. 47)

To resume the penetration to the Niger which we left in 1864, such parts of El Hadj Omar's dominions as had not been conquered were divided among his sons at his death. Ahmadu installed himself at Ségou, and Galliéni concluded a treaty with him in March 1881 by which the left bank of the Niger down to Timbuktu was put under French protection. Ahmadu repudiated this treaty stating that he had only signed a treaty of commerce. Thereupon hostilities ensued, in which Colonel (later General) Archinard bore the greatest share. In 1890 he captured Ségou, but the Toucouleur power was not finally broken till the capture of Bandiagara in 1893. Ahmadu then fled to Sokoto, where he died in 1898.

Meanwhile in 1880 Haut Sénégal had been made a semi-independent government under Senegal, with headquarters at Medine. It was separated from Senegal proper by the Falémé: eastwards its

boundaries were to be as far as French armed penetration could carry them. This district, known at first as Haut Sénégal, was the genesis of the 'Soudan Français'. Its first Commandant was Colonel Borgnis-Desbordes, who, assuming office on 1 January 1881, transferred the headquarters to Kayes, where it remained till 1904.

The two chief obstacles to French penetration of the Sudan were El Hadj Omar's son Ahmadu whom we have mentioned and, far greater, Samory, who kept the country in a ferment till his capture in 1898.

Samory was a Moslem of obscure Mandingo origin, born at San-koro in 1847, who posed as a religious reformer. Seizing Kankan in 1879, he imposed his authority on the whole of the Ouassoulou and the greater part of the Mandingo countries. He first came into contact with the French early in 1882 when he attacked Kéniéra, south-east of Siguiri. The inhabitants implored aid, and French troops from Kita, under Borgnis-Desbordes, crossed the Niger for the first time. Borgnis-Desbordes drove Samory back, but, not wishing to become involved in a major operation, himself withdrew. In January 1883, however, he occupied Bamako, but Samory cut his communications, and he only avoided disaster by a rapid retreat, though the position was made good a week later.

In the following three years operations languished owing to financial stringency, though in June 1885 the French were shut up in Nafadié by Samory. Repeated attacks on the French post at Niagassola failed, and one of his principal armies was defeated on the river Fatako, near Galé, in January 1886.

French Treaties with Samory

Samory then decided to approach the French. A treaty signed at Kenieba-Koura near Siguiri on 16 April 1886 gave the French the left bank of the Niger from the entry of the Tinkisso to Nyamina. But this arrangement would have left the tribes above the confluence of the two rivers open to attack and Paris refused to ratify. An acceptable treaty laying down the frontier as the Tinkisso from its source to its junction with the Niger, and thence the Niger to Nyamina, was signed at Bissandougou on 25 March 1887. Samory's domains on the right bank were placed under French protection, but he seems to have been regarded as free to make war on his neighbour to the east, for the French took no action, beyond informal advice, when in 1888 he attacked Sikasso, whose king—Tiéba—repulsed him with heavy loss after a siege lasting sixteen months. To keep his forces in being Samory

had to have fresh lands to pillage, so, in May 1889, he tore up the treaty, on the pretext that the French had not helped him against Tiéba, and crossed the Niger into French territory. Again the French treated with him, and by the Convention of Niako later in the year Samory ceded the country between the Tinkisso and the Niger, and undertook to restrict his armies to the right bank of the latter.

Samory denounces Treaty, 1890

The respite was not for long. Towards the end of 1890 Samory denounced the Convention of Niako, and gathered his forces on the right bank of the Niger. Severe fighting followed through the next year, but on 12 February 1892 Samory's birthplace, Sankoro, was taken and he retreated south, where he was joined by the chief of Odienné, in the Ivory Coast. In the latter part of 1892 and early in 1893 Colonel Combes scattered Samory's forces, but failed to capture their leader. Samory again collected a large army and ravished the country between Siguiri and Sikasso, but was again driven back to the Ivory Coast, where he was able to maintain and recruit his forces. He established himself at Dabakala, some 50 miles south of Kong, which town he overawed, though he did not at the moment molest it.

In April 1894 Captain Marchand arrived at Kong from Grand Bassam, and promised aid to its inhabitants. The French Government decided to divert Colonel Monteil, who was on his way to the Congo with an expeditionary force designed to forestall the British on the Nile. Sickness, the collection of carriers, and roadmaking through the forest delayed the French, and Samory had ample time to prepare. The French army had to retire when at last it came into contact with him on 1 March 1895. Thereafter in April Samory sacked Kong, a town of 15,000 inhabitants. In July his troops occupied Bole and sent emissaries to Prempeh, the King of Ashanti, with whom British relations were delicate. They were driven out of Bole by Colonel Northcott, who occupied Bondoukou, which he later evacuated, when the French established a post there.

Further Negotiations

At the beginning of 1896 Samory again attempted to negotiate with the French. Negotiations continued on and off till August 1897, when Captain Branlot and a large party of Senegalese tirailleurs were massacred near Bouna by Samory's son Santiéni Mori. To be fair to Samory, there is no reason to suppose that this treachery was authorized or desired by him, but it showed, as he himself admitted,

that, even if he was willing to live in peace with the French, he could not control his followers.

Capture of Samory

In January 1898 Samory's forces were driven out of Kong. He himself hastily evacuated Dabakala and retired west to the Bandama. Meanwhile Babemba, King of Sikasso, insisted on giving aid and asylum to Samory, and would not allow the French to establish a post in his capital. Commandant Pineau thereupon captured Sikasso on 1 May, Samory fled south-west to Man, and there he was surrounded and captured without bloodshed on 29 September 1898. He was deported to Ndjolé in Gabon, where he died 2 June 1900. Samory had kept the whole of West Africa, from the Gold Coast to Sierra Leone and from the Niger to the forest of the Ivory Coast, in a ferment for twenty-four years, during sixteen of which he was in direct conflict with the French. With him the last major obstacle to the peace of French West Africa disappeared.

COMPLETION OF FRENCH PENETRATION

Timbuktu and the East

Timbuktu had been in a state of anarchy since the fall of the Songhai Empire at the end of the sixteenth century. One set of tyrants succeeded another. At the end of the nineteenth century the ruling race were the Tuareg, and in October 1893 a deputation of the inhabitants came to the French post at Dienné begging for the protection of France. Lieutenant Boiteux arrived by river, hoisted the French flag, and occupied the town on 16 December with the goodwill of the bulk of the inhabitants. The occupation was carried out contrary to the wishes of the French Governor, but orders instructing Lieutenant Boiteux not to proceed failed to reach him. A small detachment under Lieutenant Aube was overwhelmed by the Tuareg on 28 December, and on 16 January 1894 a column under Colonel Bonnier, Commandant-supérieur of the Sudan, was massacred at Tacoubao near Goundam. Of about 25 Europeans only 6 survived and only about 100 out of 300 tirailleurs. However, Joffre, who was to attain fame twenty years later, entered Timbuktu on 9 February. Prolonged and costly operations continued against the Tuareg till 1897, and it was not until 1900 that the Sudan and the bend of the Niger were pacified. It was during these operations that the French first formed a camel corps.

The post of Zinder was established in 1899, and the meeting there of French missions from Algeria, French Sudan, and French Equatorial Africa enabled France to realize her dream of an African Empire stretching from the Atlantic and the Mediterranean to the Congo. The story of Marchand's gallant failure to provide her with an outlet to the Nile does not belong to French West Africa.

Mauritania

Mauritania, which was mentioned in connexion with Faidherbe's administration, was hardly touched again by the French till 1902. There had indeed been some exploration along the coast and a little inland. In 1880 and 1881 there had been treaties, by which the Arabs agreed to keep the caravan routes open, and in 1892 the Emir of Adrar agreed to enter into no foreign relations except with France. Though the country was generally recognized to be within the French sphere, there was no serious attempt at penetration till Coppolani, who had had remarkable success in the Hodh and Azaouad in 1898, was charged by the Governor-General to get into touch with the Arabs and establish French authority, peaceably if possible. He succeeded in getting the Marabouts on his side, persuaded the Trarza and Brakna Arabs to accept French authority, and made it possible to build posts in their country. In 1904 Mauritania became a *territoire civil* with Coppolani as its Commissaire-Général. After arranging for an expedition to study fisheries in Lévrier bay, he started north hoping to pacify Tagant. The population was undoubtedly well disposed to him, but at Tidjikdja in May 1905 he was murdered by followers of the fanatical Ma el Ainine, with the connivance of the Emir of Adrar, who was determined that French influence should penetrate no farther. After this it was clear that peaceful penetration had no chance of success, especially as Abd el Aziz, the Sultan of Morocco, sent an ultimatum to the French to evacuate the country. Moulay Idriss, who led the Moroccan forces, laid siege to the French forces at Tidjikdja in November 1906. However, Moulay Hafid of Morocco adopted a less intransigent attitude than his predecessor, and by the end of 1907, when Gouraud was appointed Commissaire-Général of Mauritania, the occupation of Tagant could be considered complete. Adrar, however, took several more years to pacify, but the work was done before the 1914-18 War, during which the population as a whole manifested an admirable loyalty.

Though there have been no serious risings since, police measures, effected largely by flying squads of camel troops, but not unattended

by the loss of French lives, were necessary all through the twenties. One can hardly wonder at this fact when one considers the country, its nomad inhabitants, and the small forces France has been able to maintain there.

By the decree of 4 December 1920 Mauritania attained full status as a colony under a Lieutenant-Governor.

THE SOUTHERN COLONIES

It must be recognized that Senegal is, and has been from the first, the main base from which penetration has advanced. Till the last quarter of the nineteenth century it was the only colony which really counted with France. Till the fear that Great Britain would hem her in roused her to action, she treated her other settlements in West Africa rather as playthings for her merchants than as fields for French dominion. Once roused, she acted with such vigour that by the end of the century British settlements in West Africa were but islands standing in a French sea. Hence it is that the histories of the colonies to the south are distinct and separate, joining that of Senegal only when all were federated in 1895. These separate histories will be sketched here so far only as is necessary to the understanding of the main story. Further details will appear in Volume II, which deals with the individual colonies of the Federation.

FRENCH GUINEA TO 1900

The term 'Côte de Guinée' is used by earlier French writers to include all the west coast south and east of Senegal. It is, however, used here to describe only the colony known as French Guinea.

The Peace of Versailles in 1783 restored to the French their possessions in Senegal and recognized their right to trade farther down the coast. The journeys of the early explorers which have already been noticed often crossed the hinterland of the present colony. In the early nineteenth century Freetown, in Sierra Leone, attracted most of its trade, but in 1838 there were several French factories exporting ground-nuts and coffee from the valley of the Rio Nunez, and in 1847 the Bordeaux Chamber of Commerce asked in vain for a military post to be established there. In 1845 'Les Rivières du Sud', comprising all French settlements south of Senegal, were placed under the authority of the naval commander-in-chief at Goree.

Though treaties of commerce had been made with the chiefs, it was not till after a bombardment that Boke passed into French sovereignty on 5 April 1849. In 1866 a French protectorate was estab-

lished on the Mellacorée river and a fort built at Benty. These two events effectively prevented the coastline between the Gambia and Sierra Leone passing into British hands. Between 1877 and 1895 Olivier de Sanderval explored Fouta Jalon, where, though he set up something approaching a private kingdom, he undoubtedly paved the way for the official missions, which resulted in the whole of Fouta Jalon being placed under French protection. Great Britain formally recognized France's rights in French Guinea in 1882, and Germany did the same in 1885 in return for recognition of her claims in Togo. Portugal followed suit in 1886. Conakry, which had been ceded by its native rulers in 1885, was only occupied in 1887 for fear that the British would claim it as part of the Los islands, which, however, they gave up to France in 1904.

THE IVORY COAST TO 1900

One or two religious missions visited the Ivory Coast in the seventeenth century, and at its close a trading post was established at Assinie. The Dutch bombarded it in 1701, but failed to take it. It was, nevertheless, abandoned in 1704. At Grand Bassam a French factory lasted till 1707. After this no further official French contact took place till Bouet-Willaumez made cruises along the coast of what is now Liberia and the Ivory Coast. In 1842 treaties were made with the chiefs of Assinie and Grand Bassam, and forts were built on ceded territory. In the following years French influence was extended west of Grand Bassam, a fort being constructed in 1852 at Tabou, whose chiefs accepted French sovereignty in 1853. French penetration proceeded till the Franco-Prussian War of 1870, when the garrisons were withdrawn and Arthur Verdier, a merchant, was left in charge. He or his agents, of whom the best known was Treich Laplène, represented France in the Ivory Coast till 1889, under the nominal authority of the Governor of the Rivières du Sud. Nobly did Treich Laplène push French interests by treaties and explorations during his term as French Resident, but to France the development of the Ivory Coast was a secondary consideration.

The main object of French policy at this time was to prevent a British protectorate over the hinterland between Sierra Leone and the Gold Coast, which would have barred French access to the Niger from the south. This object was attained by a series of treaties of protection with the chiefs in the eastern hinterland of the colony, ending with Kong in 1888. The British recognized the *fait accompli* in the Convention of 10 August 1889, which purported to settle the

frontier with the Gold Coast to latitude 9° N. (but the final settlement was reserved for the Convention of 14 June 1898). This done, the French turned their attention to the west, and, in the nineties, similar treaties were made with the chiefs in the Cavally, Sassandra, and Bandama valleys. To the north the route used by Binger in 1888 between Bamako and the Ivory Coast was more fully explored. A frontier convention with Liberia of 8 December 1892 was an expression of international goodwill, but, being founded on insufficient geographical knowledge, led to numerous practical difficulties.

A decree of 10 March 1893 made the Ivory Coast an autonomous colony under a Governor. Two years later it became part of the Federation.

For a time the Ivory Coast was troubled by the freebooter Samory, but that fact is part of the story of West Africa as a whole, and it has been told elsewhere. Events in the Ivory Coast subsequent to this are of local interest only.

DAHOMEY TO 1900

About the beginning of the seventeenth century the country now known as Dahomey was part of the extensive kingdom of Allada (or Ardra) with its capital at Allada. On the death of one of its sovereigns, probably early in the century, this state split into three, each under one of his sons. Allada retained its old name and the territory in its immediate neighbourhood, as far south as the coast. Another son migrated to the east and formed the state of Porto Novo, while the third brother travelled north and eventually established the kingdom of Dahomey, with his capital at Abomey. Between 1724 and 1728 Dahomey absorbed both the other states.

First French Contact

In 1666 Villault de Bellefond made a brief inspection of the Guinea coast on behalf of the Compagnie des Indes, who then held the French monopoly south and east of Cape Verde. He went no farther than the Gold Coast, where, in the following year, either he or Du Casse made a treaty with the King of Komenda which was never put into effect. Du Casse reached Dahomey, where he landed two Capuchins, who were only saved from massacre by the protection of the King of Ouidah. In 1669 an expedition under D'Elbée obtained leave from the King of Allada, the overlord of Ouidah, to establish a trading post, and took back an ambassador who was received by

Louis XIV with marked honour. D'Elbée also took missionaries to Dahomey: these met with no more success than their predecessors.

Eighteenth Century

In 1725 the French post at Ouidah was under the command of a lieutenant, who was himself under the orders of the Company's director-general residing at Savi, the capital. The English also had a fort at Ouidah and a director at Savi. The Portuguese had an unfortified establishment. The Dutch had no buildings at Ouidah, but had their headquarters at Savi. French prestige stood highest among the European nations. In 1704 the King of Ouidah insisted on neutrality and peaceful commerce in his domains between various European nations at war, and enforced it successfully until his kingdom was overthrown by Dahomey in 1727. Agadja, King of Dahomey, insisted on the Europeans abandoning their possessions at Savi, though he allowed them to continue to trade at Ouidah. (Savi was a little distance inland from Ouidah, and is not to be confused with the modern Savé.)

Though the French retained their foothold in Dahomey during the eighteenth century, and in 1789 even built the post of Amokou, near Komenda in the Gold Coast, which they held for only a few years, little information is available. French trading posts established in 1786 near Warri in the Bight of Benin were destroyed by the British in 1792 and were not re-established, and in 1797 the garrison of Ouidah was withdrawn, though the dues continued to be paid to the King of Dahomey. Not till 1841 did the Minister of Marine authorize the Marseilles firm of Régis to occupy the fort at Ouidah for commercial purposes.

French Occupation

In 1851 Bouet-Willaumez visited Abomey in person and concluded a treaty of commerce and friendship with Gezo, King of Dahomey. Porto Novo definitely accepted the protection of France in 1863, Petit Popo (Anecho) the following year, and 1869 saw Cotonou yielded in full sovereignty. The hostile attitude of the natives and indeed of the British who, claiming these territories as part of Lagos which they had occupied in 1863, blockaded Cotonou, led to the virtual abandonment of the protectorate for some years. Abortive negotiations took place in 1875 with the British for the exchange of such rights as the French possessed in Dahomey for the Colony of the Gambia. Meanwhile Gelele of Dahomey, the suzerain of Toffa

of Porto Novo with whom the French had concluded their treaty, was flirting with the Portuguese. However, in spite of the covetous attitude of English, Portuguese, and Germans, a French Protectorate—this time effective—was declared over Grand Popo, Petit Popo, Porto Novo, and Porto Ségouro in 1883. These settlements, which took the name of 'Établissements du Golfe de Guinée', were administered from Gabon till 1886, when they were attached to Senegal. Portuguese pretensions were withdrawn in 1887. In 1885, as a result of the Berlin Conference, the German claim to Togo was recognized, involving the cession of Anecho and Porto Ségouro, and in 1889 the Lagos–Porto Novo boundary was agreed upon as far north as latitude 9°.

Behanzin

Naturally Gelele did not tamely submit to these invasions of his suzerainty and attacked his vassal Toffa. After fruitless negotiations the first French expedition was undertaken against his successor Behanzin in 1890. After campaigns lasting several years, principally under General Dodds, Behanzin surrendered. He was deported to Algeria and died there in 1906. His kingdom was divided into two, both under the protection of France. This form of government was not very successful, and in 1900, on the death of Toffa, both monarchies were suppressed, and Dahomey, which had been constituted a colony in 1893 and placed under the Governor-General of French West Africa in 1899, came under direct French rule.

Frontier Questions

In 1897 the whole frontier between Togo and Dahomey was settled, though it was not actually demarcated till 1912.

Grave difficulties and a deal of friction took place before the Convention of 14 June 1898 finally settled the frontier between Nigeria and French possessions to the west. The Royal Niger Company objected to the exercise of the rights of free navigation claimed by the French on the lower Niger. There had also been difficulties with the trading establishments of the Compagnie Française de l'Afrique Occidentale in British territory. That company was bought out in 1885. Further there were conflicting views as to which power was to rule over the Moshi, Gourounsis, and Gourmas, some of whom had already made treaties with both Powers. The convention gave the bulk of these tribes to France, but the eastern part of Borgu, and Busa passed to the British. The frontier on the Niger was moved

farther south near Illo, which was left to the British, but the free right of commerce and navigation below the frontier was granted, and the British undertook to lease to the French two trading settlements on the lower Niger. These were never taken up. For a short time France attempted to maintain a commercial flotilla on the lower Niger, but in 1904 abandoned the scheme as too costly.

THE FEDERATION

The first decree establishing a central government for French West Africa was issued on 16 June 1895. It grouped Senegal, French Guinea, French Sudan, and the Ivory Coast under the Governor of Senegal as Governor-General. A Lieutenant-Governor at Kayes was responsible for the Sudan, and there were Governors at Conakry and Grand Bassam. In 1896 the Ivory Coast was detached from the Federation, to be restored to it by a decree of 17 October 1899, and Dahomey was included at the same time. By the same decree French Sudan ceased to be a colony. Some portions of its territory went to French Guinea, others to the Ivory Coast and Dahomey. The remainder, under the name of the Territories of the Senegambia and the Niger, was attached to the Government-General with a delegate at Kayes. In common parlance it never ceased to be 'Soudan Français', which title was restored to it in 1920.

The regime established by this decree, and subsequent amendments to it, was not very satisfactory. The constituent colonies retained their independent financial and administrative organizations, under the general direction of the Governor-General, but their intense parochial patriotism proved strong enough to prevent the introduction of a distinct budget for the Federation as a whole. That separate budget had to come, however, and it was provided by the decree of 18 October 1904, which is the basis of the present system. The Federal Government is responsible for certain services of interest to the whole Federation and for the raising and service of loans, taking the customs duties throughout the Federation and certain other taxes. This broad financial control has given the Central Government power to decide the economic development of the whole and of the individual colonies as parts of that whole. It has the power of the purse. In local services, subject to the general direction of the Governor-General, the various colonies retain their own administrative and financial autonomy, each under its own Governor. The decree of 1895 made the Governor of Senegal *ex officio* Governor-General with his capital at St. Louis. In 1902 the

Governor-General moved to Dakar, and Senegal received its own Lieutenant-Governor residing at St. Louis. The higher title of Governor was restored to all the Colonies in 1937.

THE WAR OF 1914-1918

It cannot be denied that there was a good deal of unrest among the native population during the Great War. The weakening of the French forces, the call for troops, the final steps taken to secure them, and the shortage of imported luxuries all fostered it. Many natives of neighbouring French colonies crossed into the Gold Coast during the war years. The Oulimiden Tuareg, whose chief, Firhoun, had submitted to the French at Gao in 1903, were the first to give actual trouble. While French authority was vacillating, a serious famine occurred in 1913, and rumours of French disasters, in the early days of the war, precipitated revolt. In the autumn of 1914 they rose *en masse*.

The rising was promptly suppressed, but Firhoun, after being sentenced, was rather strangely pardoned and restored. Less strangely he raised the standard of rebellion again in February 1916. Defeated on 9 May, his herds were captured, and he fled north to be killed by a Targui of Ahaggar on 25 June.

In 1917 Tegama, the Sultan of Agades, likewise encouraged by rumours and by the weakening of French forces, threw off his allegiance. He was supported by a marauding army from Fezzan, under one Kaossen, a disloyal chief of Air. This movement constituted a menace not only to the northern Sudan but also to Tunisia and Algeria. Prompt action averted it and the besieged French post at Agades was relieved, but for a time the situation was very critical.

Nevertheless, recruiting in French West Africa during the war shows up well. Up to 1912 there had been no conscription of the native population. The decree of 17 February 1912 introduced it in principle, but only as a reserve measure, and all the troops at the outbreak of war were volunteers. In August 1914 there were 14,000 tirailleurs serving in West Africa and over 15,000 elsewhere, principally in Morocco. By December 1914 a further 9,000 had been enrolled. By the end of 1916 a further 72,000 had been enlisted voluntarily, and there were 31 Senegalese battalions on the Somme front in 1917. The year 1918 produced a further 63,000 men, partly by voluntary means, partly by conscription. Of the 173,000 troops provided, 134,000 went overseas or to Algeria or Tunisia during the

war, whilst the remainder took their full part in the Togo, Cameroons, and East African campaigns.

From the outbreak of war French West Africa sent all the supplies for which transport could be found to France. It was not until April 1917, however, that the Home Government took steps to mobilize the resources of the Federation, to purchase them, and to ensure that they reached France. In some cases these measures were relaxed in favour of Allied countries even before the Armistice, but the following figures of exports to France show the nature of the contribution made:

	Tons
1916 . . .	11,182
1917 . . .	11,562
1918 . . .	141,102
1919 . . .	296,302
1920 . . .	5,645

The principal products taken were ground-nuts, palm products, rice, and other cereals.

Prior to the war the Central Government gave subventions of some 4½ million francs to the various colonies. The total sank to just over one million in 1916, and 387,000 francs in 1917. Expenditure on public works fell by more than two-thirds.

THE FEDERATION TO-DAY

Since the institution of the Federation there have been changes in the names, sizes, and status of its component parts. A decree of 5 September 1932 suppressed the Colony of Upper Volta: the bulk of its territory was added to the Ivory Coast, the remainder going to French Sudan and Dahomey. Since that date the Federation has consisted of Senegal, French Guinea, the Ivory Coast, French Sudan, Niger, Dahomey, and Mauritania. Dakar and Goree with the country in their immediate vicinity now form an independent district (*circonscription*) whose administrator is directly responsible to the Governor-General.

The line of demarcation between the territory of the Federation and French possessions in north Africa was settled in 1905, but the international boundary between the French and the Italian colony of Libya had to wait till the Treaty of Rome in 1935.

TOGO

No-man's-land

Until the German occupation, Togo, with its seaboard of 32 miles and a depth of some 300, cannot be said to have existed as a

separate entity. Wedged in between the powerful states of Ashanti on the west and Dahomey on the east, it suffered from the exactions and depredations of both. At any time prior to the German occupation the British might have had it for the asking, and indeed, up to that moment, the natives of the western portion at any rate considered themselves as under British protection. The short coastline affording no suitable landing-place, trade went out through the Gold Coast, or French Dahomey, which then extended east from Porto Ségurou. The Germans established a factory at Anecho (Petit Popo) in the early eighties and made a treaty with the local chief, and at the time of the German annexation the trade was shared equally by Britain, France, and Germany. At the request of the Hamburg and Bremen traders and with the goodwill of Great Britain, Bismarck sent Dr. Nachtigal in 1884 on a mission, ostensibly to inquire into the state of German trade on the west coast, and a German warship was also sent to Petit Popo to impress the natives. The outcome was the hoisting of the German flag at Baguida on 5 July, Lome on 6 July, and Porto Ségurou on 5 September 1884, and the notification to Great Britain on 15 October of a German protectorate.

The German Colony, 1885-1914

This *fait accompli* was recognized at the Berlin Conference later in the year. The first Franco-German boundary treaty was signed in December 1885, by which France abandoned all claims to Anecho and Porto Ségurou. In 1897 the Togo-Dahomey boundary was settled throughout its whole length to 11° 10' N. by Convention of 23 July. The delimitation took some years, and was only finally confirmed by the Franco-German declaration of 28 September 1912. Similarly the first frontier agreement with Great Britain was made in July 1886, though it was not till 1904 that the boundary was carried to latitude 11° 10' N., where the Gold Coast boundary turns east.

The history of Togo, and the details of its administration under German rule, which have little bearing on the general history of French West Africa, will be reserved for the later volume of this work. It must, however, be stated that the administration was excellent, marred though it may have been by the usual German harsh treatment of the natives, and by 1914 Germany could justly regard her record with pride. She gave her little model colony a stable government and economic prosperity. Indeed, Togo was the only German colony to become financially independent of the Fatherland. Communications were developed, agriculture and commerce were fostered, and

the well-being of the inhabitants was carefully considered. Imports rose from £175,850 in 1900 to £571,391 in 1912, exports in the same period mounting from £152,900 to £497,945. Expenditure for 1913 was £202,856 and the revenue was £169,229, of which £23,667 was collected in head tax.

Conquest

On the outbreak of war in 1914 the German Governor, who in the few days during which British intervention appeared doubtful had been preparing an attack on Dahomey, proposed neutrality to his colleagues on either flank, 'in the interest of the native races'. It is worth remarking that the high-power wireless station at Kamina, some 80 miles north of Lome, and capable of speaking to Berlin, German South-West, and German East Africa, had just been completed. Both French and British troops at once crossed the frontier. The German forces retired up the railway, on 7 August, surrendering Lome and a belt extending 74 miles inland from the coast. After a very sharp fight on the Kara river on 22 August, in which the German losses were small but those of the Anglo-French forces under Lieutenant-Colonel Bryant of the Gold Coast Regiment amounted to 17 per cent., the Germans destroyed the wireless station, and on the 26th surrendered the whole colony unconditionally. For the remainder of the war the country was divided between the British and French, Lome, Klouto, Krachi, and Yendi falling to the former, and the remainder to the latter. Both portions were administered under a very mild form of martial law, the British portion being under the supervision of the Governor of the Gold Coast, the French portion under the Governor-General of French West Africa.

By an agreement of 10 July 1919 the provisional boundary was revised in favour of France, who acquired the whole coast, Lome and both railways running from it, together with a part of the Misahöhe district.

Mandate, 1922.

This division was adopted by the League of Nations, which on 20 July 1922 issued mandates of the B class to the two Powers for the government of their respective shares. The British portion is, for all practical purposes, administered as though it were part of the Gold Coast, and passes out of this story. The French portion is administered by a Commissioner of the Republic. In 1934, as a measure of economy, some of the higher ranks of the civil service serving in Dahomey

or Togo undertook duties in both territories, and the Lieutenant-Governor of Dahomey became also Commissioner of the Republic for the time being. By 1937 Togo had recovered the headship of its own services and its own Commissioner, working under the general direction of the Governor-General as High Commissioner for Togo. It is a separate entity, both financial and administrative, and is no part of the Federation.

Since 1922 progress under the French Mandate has been steady, but, as having little bearing on French West Africa as a whole, will not be described here.

LIST OF THE PRINCIPAL TREATIES AFFECTING FRENCH WEST AFRICA AND TOGO

- 1678 Peace of Nimeguen—Goree ceded to the French by the Dutch.
- 1697 Peace of Ryswick—restored to the British, James island, Gambia.
- 1713 Peace of Utrecht—the Assiento or contract for supply of slaves to the Spanish West Indies passed from France to England.
- 1727 Arguin ceded to the French by the Dutch.
- 1763 Peace of Paris—restoring Goree and Alreda (not St. Louis) to the French.
- 1783 Treaty of Versailles—restored all French possessions, but reserved to the British the right to trade in gum from the bay of St. John to Portendick.
- 1814, 30 May. Peace of Paris. Restored to France her West African possessions as they existed on 1 Jan. 1792, but subject still to the British right to trade in gum. (This peace was confirmed, after Waterloo.)
- 1857, 7 March. Alreda handed to the British in return for the abandonment by the British of their privileges in the gum trade.
- 1882, 28 June. Boundary Convention—Sierra Leone and French Guinea.
- 1885, 26 Feb. General Act of the Berlin Conference.
- 1885, 24 Dec. Franco-German Convention—France recognizes German claims to Togo, including Anecho and Porto Ségouro. Germany abandons all claims in French Guinea. Boundary between Togo and Dahomey agreed on the coast.
- 1886, 12 May. Convention between France and Portugal as to boundary between French and Portuguese Guinea.
- 1886, 14 July. Anglo-German Agreement on Togo—Gold Coast boundary.
- 1889, 10 Aug. Anglo-French Convention dealing with boundaries (i) Gold Coast—Ivory Coast to lat. 9° N.; (ii) Senegal—Gambia; (iii) Lagos—Porto Novo (Dahomey); (iv) Sierra Leone—French Guinea.
- 1892, 8 Dec. Franco-Liberian Boundary Convention.
- 1895, 21 Jan. Further Convention as to the boundary between Sierra Leone and French Guinea.

- 1897, 23 July. Franco-German Agreement on the Togo boundary, carrying it to lat. 11° N.
- 1898, 14 June. Anglo-French Convention, carrying the boundary with Nigeria to the Niger at Illo, giving the French rights of navigation on the lower Niger, and further defining the boundary from the Niger to Lake Chad, and the Gold Coast-Ivory Coast boundary. This agreement also included an arrangement between France and Great Britain by which in Nigeria and the Gold Coast, the Ivory Coast and Dahomey, British and French subjects and protected persons should be entitled to equal treatment in the territory of the other nation in all matters of river navigation, commerce, tariff, and taxes for 30 years. (Denounced by France in 1936.)
- 1900, 27 Jan. Franco-Spanish Convention settling the boundary of Rio de Oro.
- 1904, 8 April. Anglo-French Convention further defining the boundary with Nigeria, and modifying that between Senegal and the Gambia. Great Britain cedes the Los islands.
- 1907, 13 Sept. Franco-Liberian Boundary Convention.
- 1912, 28 Sept. Franco-German Declaration confirming the delimitation of the Togo-Dahomey frontier.
- 1919, 28 June. Treaty of Versailles—Germany renounced all colonial claims.
- 1919, 10 July. Anglo-French Agreement as to the division of Togo.
- 1935, 7 Jan. Treaty between France and Italy signed at Rome defining the boundary between Libya and the French possessions. By this treaty Italy obtained an addition to her territory of 114,000 square miles.

CHAPTER VII

THE PEOPLES

THE human inhabitants of French West Africa may be divided into two main groups: the peoples of the north and the negroes.

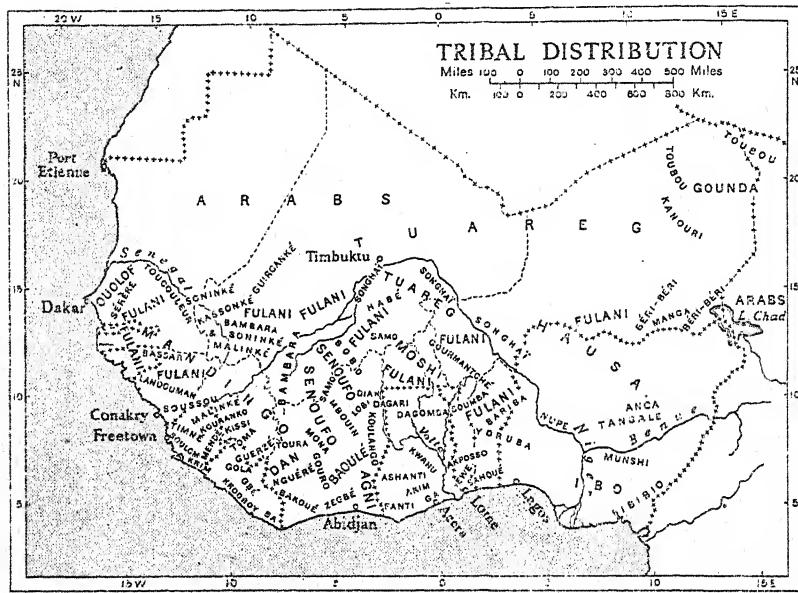


FIG. 49. *Tribal Distribution*

This grouping is not entirely racial, but a purely ethnological division would ignore the history of the last five hundred years. As Fig. 49 shows, the country is by no means neatly parcelled out into well-defined tribal areas. Northern religions, organizations, and languages have invaded the south, and southern blood the north. The slave trade spread negro blood not only into western Asia and into the Americas but also among the northern traders themselves. Speech is not always a reliable guide to racial origin. Arabic is taught in thousands of bush schools; Hausa, almost a lingua franca in many parts of French West Africa, is a Hamitic language with a negro vocabulary written in Arabic characters; while the Fulani, who are not negroes by race, speak a negro language. The coastal peoples have been in

close contact with Europeans since the fifteenth century, and it would be idle to pretend that they are the pure descendants of those who were first seen by the voyaging Portuguese. In short, the subject is complex, and the following pages only profess to give a general account of it.

I. THE PEOPLES OF THE NORTH

(a) *Characteristics*

This group includes peoples exhibiting every variety of racial character from pure Arab to almost pure Negro.

Arabs. 'Arab' is a cultural term rather than an ethnological one; and additional difficulties in its use arise in French West Africa from its indiscriminate employment by the French to describe any Arabic-speaking African Moslem. From the racial point of view the purest Arabs have the following physical characteristics: skin, white to brown; hair, black and almost straight; average height 5 ft. 7 in.; Cephalic Index 74-75, i.e. only slightly dolichocephalic (long-headed); nose, fine and straight or somewhat convex; lips, moderately thin; jaw, orthognathous (not protruding); face, oval; body, spare, but supple and vigorous, with delicate wrists and ankles. Historically these Arabs probably came in from the north-west after the successful Hilalian invasion of the Barbary States in the tenth century, though some may have come from the north-east. To-day pure types are not numerous. (Fig. 50.)

Berbers. The Berbers are a very ancient people, of mixed origin, and similar to the Mediterranean types of southern Europe. They have a skin which varies from very dark brown to a sun-burned white that gives a swarthy appearance; hair, black and slightly wavy, with much body hair; average height 5 ft. 6 in.; Cephalic Index 72-73, i.e. dolichocephalic, usually with projecting occiput; nose, mesorrhine (of medium width); lips, full; jaw, often prominent and well-bearded; face, short and broad, with well-developed cheek-bones; eyes, brown and deep-set; the long bones of the body are heavily built, and the insertions of the chief muscles are clearly visible.

Fulani. The Fulani are probably akin to the Gallas of Abyssinia. They seem always to have been herdsmen, but the history of their wanderings is largely a matter of conjecture. They have a skin varying from reddish-brown to black; hair, black and straight or ringleted, with very little body hair; average height 5 ft. 6 in.; Cephalic

Index 74, i.e. dolichocephalic; nose, prominent; lips, fairly full; face, long oval. (Fig. 51.)

These northern peoples have much in common. They have a history of nomadism and war; they despise agriculture as an affair of slaves; and they are fierce and proud.

Clothing and Personal Decoration. Arabs and Berbers wear a cotton



FIG. 50. *An Arab*

shirt of blue or white, loose baggy trousers reaching below the knee, and often a flowing white over-garment (*boubou*) coming down almost to the ankles. Women wind round their bodies a very broad strip of cotton cloth (*guinée*) which is usually brought over the shoulders and head in such a way as to conceal the lower half of the face. Sometimes they wear long, loose trousers, and sometimes a sort of bolero. Veiling of the face is not strictly enforced in this part of

Africa, and many women, especially the Tuareg, content themselves with a head-dress consisting of a band of embroidered cotton cloth with the two ends hanging down. Where the people have more negro blood, men wear wide short breeches or a loin-cloth and a sort of sleeveless shirt, women a loin-cloth, with a long cotton *boubou* for both sexes. Hats of straw trimmed with leather or of cotton are



FIG. 51. *A Young Fulani Woman*

frequently worn, and, for long journeys, leather sandals. Tattooing and face scars are common. Women wear silver bracelets and usually have smaller silver rings set in the hair at the side of the cheek. In many cases they blue their lips and eyelids with antimony. Fulani women often dress their hair in a kind of crest from the nape of the neck to the forehead. Tuareg men usually wear above the elbow a bracelet of polished stone, such as serpentine.

Tents and Huts. As most of these peoples are pastoralists living in

the savanna or the semi-desert, tents are more important than permanent buildings. These tents are of skin or rough cloth stretched over a wooden framework. The skins are those of the animals from the herds, and the cloth is a mixture of wool and camel-hair, woven by women. Among the Arabs each tent is divided into two compartments, one for women and children, and one for men. (Fig. 52.)



FIG. 52. *An Arab Tent*

Settled communities have huts. These are of sun-dried clay bricks or of *pisé*. The latter is made by ramming stiff clay between boards, which are removed when it hardens. The huts have straw roofs and, occasionally, verandas. Groups of huts may be surrounded by a hedge that also encloses cultivated ground.

(b) *Tribal and Family Life*

Organization. Broadly speaking, each tribe has four classes: nobles, mallams (marabouts), artisans, and serfs. The spirit of society, in particular of Arab society, resembles that of feudalism: it is based,

not on money, but on birth, property, rights, and duties; and every man has his own part to play. Powerful emirs in Mauritania exact a tribute called *horma* in return for the protection of their tributaries from oppression by strangers. Among the Fulani these divisions are less rigid in proportion as there is influence by their negro neigh-

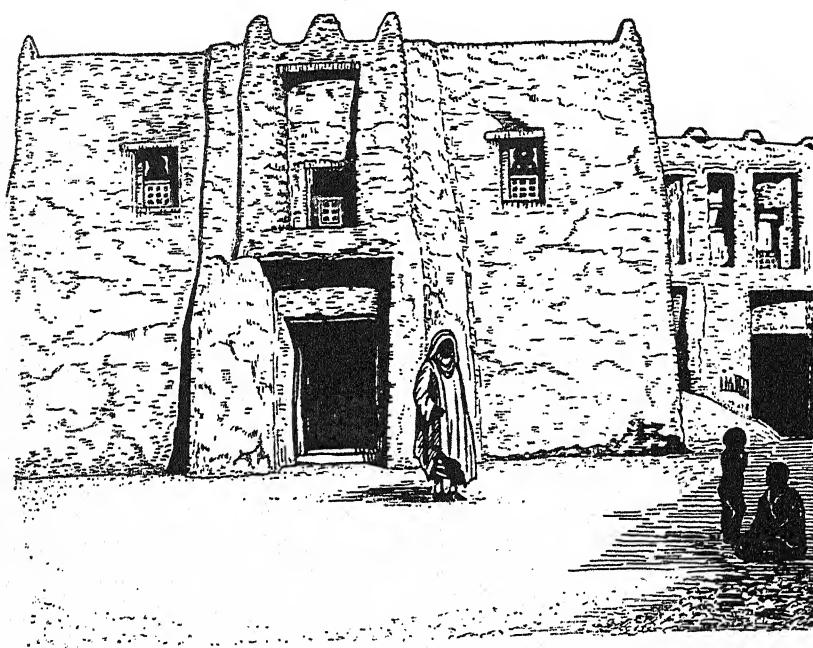


FIG. 53. *An Old House at Timbuktu*

bours. Mallams do not carry arms, and their numbers include doctors, magistrates, and teachers, as well as priests.

Tribal organization is liable to be very weak and schismatic. Arab chiefs are usually somewhat autocratic, but Berber rulers have small authority compared with that of the Jemâa (tribal council); although, again as in feudal Europe, a powerful chief can often obtain for himself and his family a pre-eminence which is seldom more than temporary. The composition of the Jemâa varies from place to place and from time to time; and, to use an English analogy, may be equivalent to that of a county, a rural district, or a parish council.

Women and Marriage. The status of women varies. That of Berber women, for example, is remarkably high, and they are better educated than men who are not mallams. They give advice on political matters, and they can acquire, possess, and administer their own property after marriage. Fulani mothers are respected by their children, and always consulted on important affairs. In spite of the fact that Arabs are rarely polygamists, the position of Arab women is relatively low. This is due to the orthodox Moslem tradition of a veiled, secluded, and backward harem. Marriages are celebrated by a mallam, and two witnesses represent the betrothed, who both belong to the same social class. The bridegroom pays a 'bride-gift' of animals or silver, but he does not receive his wife until several days or even weeks after the marriage ceremony. Divorce is both easy and frequent. The wife's parents give back the bride-gift, and the divorced woman cannot remarry for at least three months. Among the Fulani polygamy is the rule rather than the exception, and the number of a man's wives is the measure of the respect that he receives from his neighbours.

Excision is commonly practised on girls. The operation is performed any time before marriage, on an average at the age of 12. Circumcision of boys is not quite so universal.

(c) Islam

Distribution. A line drawn from St. Louis through Kayes and Mopti to Say marks a rough boundary between lands whose peoples are almost wholly Moslem and those where pagans predominate. However, at least 40 per cent. of the population of Senegal, French Guinea, French Sudan, and Niger are Mohamedan. It is difficult to say whether numbers are increasing at the present time.

Beliefs. There is much laxity and departure from the strictest tenets of Islam, and Berber and negro adherents mingle the beliefs of the Prophet with the grossest superstitions. In brief, their religion is superficial, and many animistic practices survive. The attraction of Islam for West Africans is not so much spiritual as social. It is a masculine religion. It came to them as the cult and civilization of aristocratic peoples, often of successful conquerors and masters. It recognizes no colour bar, and it undoubtedly represents an enormous advance from animism. Moreover, its demands are not very exacting, its code of morals is not severe, and its duties are not arduous. Also it has brought the black African into contact with a



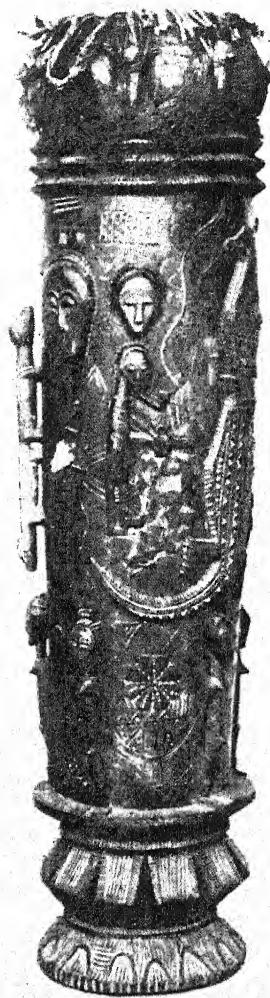
50. *Arabs*



51. *A professional scribe*



52. *A negro woman*



53. *A native drum (Ivory Coast)*

world-wide movement and has broken the narrow bands of clan and tribe.

Important centres of learning have been established, notably at Timbuktu and at Boutilimit; and in most Moslem villages there is a mallam to teach writing and reading the Koran; or, at least, chapters of the Book are learned by heart under the pretence of being read. All this work is done in Arabic. These schools are too purely religious and too mechanical for modern education, and in their original form they are slowly disappearing. They are, in fact, in some sense typical of Islam in modern Africa. It is sterile; and it has done nothing to combat moral evils, to abolish slavery or polygamy, to increase knowledge of hygiene, or to advance the position of women. The status of Berber women, mentioned above, is in spite of and not because of Islam. Most of the mallams belong to one or other of the two great religious orders, the Tidjaniya and the Kadriya; but there is much unorthodoxy in creed and ritual. The Malekite tradition is followed.

The average Moslem in French West Africa is neither fanatical nor intolerant. He is courteous and hospitable, but far too frequently also deceitful and cruel.

II. THE NEGROES

(a) Characteristics (Fig. 54)

The principal physical characteristics of the pure negro are as follows: skin, black or very dark brown; hair, black and woolly; average height, 5 ft. 8 in.; Cephalic Index 74-75, i.e. moderately dolichocephalic, nose, platyrhine (broad); lips, thick and everted; forehead, often bulging; jaw, prognathous (projecting); body, burly, short-legged, and long-armed. In disposition he is commonly amiable, cheerful, docile, and care-free; though he may also be lazy, stupid, and deceitful.

There are no pygmies in French West Africa.

Clothing and Personal Decoration. Young children wear no clothes at all, and adolescents wear a narrow band of cloth between the legs. The costume of adults differs greatly from tribe to tribe. Men of the more primitive peoples wear a small loin-cloth of cotton, palm fibre, bark cloth, or leather, often fringed or patterned, and the women two bunches of leaves hung from a narrow leather belt. In proportion as the climate becomes less equatorial both men and women wear the costume of the desert dwellers as described above. The

place of clothing is filled, after a fashion, by cicatrization or, less frequently, by tattooing, almost the whole body being covered with designs in various colours. The patterns are usually made during youth and irritated with coloured earth and caustic juices. Very large scars called 'keloids' form, and remain permanently on the skin.



FIG. 54. *A Forest Negro (Gouro)*

Amulets, bracelets, necklaces, and anklets are worn, particularly by women. Some of these are made of Aggri beads, which have been known on the west coast for centuries and which possibly originated in Carthage or Egypt.

Huts and their Contents (Figs. 56-9). There are several different shapes of hut. The most advanced tribes, e.g. the Songhai, have semi-circular huts made of skins or matting on a framework of branches. Temporary huts are made of grass or straw. Such peoples as the Toucouleur and the Moshi have cylindrical huts: these are of clay or rough bricks with a straw roof on a conical wooden frame. Rectangular huts with straw roofs, often gabled because of the rains, are used by others, for example the Bobo and the Soussou. Many huts, especially in the

drier parts, are made of beaten earth. Military strongholds of similar construction may be large enough to accommodate a whole village. The interior furnishings of all these habitations are exceedingly simple. Skins or rugs on which to sleep and a few cooking-pots and utensils are the chief items. There may also be found snuff-boxes,



FIG. 55. *A Mandingo*

tobacco pouches, pipes, fans, and counters for gambling games. Musical instruments include horns, wooden drums (tom-toms), and a form of guitar, the so-called West African harp. Weapons are guns, iron swords, shields of plaited straw and leather, and bows, tapering at each end, with bowstrings of fibre, but no clubs or slings.

(b) *Tribal and Family Life*

Organization. The negro is a member of a well-organized community, which, in its own way, has reached a fair level of civilization.

In each village there are usually four clans, each consisting of a group of families descended from a common stock. Each has its own cluster of huts, and each its own distinctive totem; intermarriage between members of the same clan is forbidden; and among the nomadic peoples the clan has often a separate name. The head man of the village is commonly the chief of the oldest family, and combines



FIG. 56. *Cylindrical Huts*

civil with religious powers. He is traditionally the descendant of the first settler, though, in the case of recent migration, he may be elected by the community. He is the high priest of the village, the one person who can propitiate the local spirits and, by making them offerings, obtain their goodwill and protection. In some villages there may be a second chief for administrative and political purposes; but his power is purely civil, and the head man remains supreme with regard to the allotment of land as well as in spiritual matters.

Classes and castes can be distinguished among the more advanced tribes. There are four main divisions: nobles, freemen, serfs, and



54. *Fulani women grinding corn*



55. *A courtyard at Dienné*



56. *The framework of a round hut*

slaves. This last class survives to-day in but few places. The freemen form the biggest class and may be arranged into three occupational groups: (i) agriculturalists, herdsmen, hunters, fishermen, and



FIG. 57a. Round Huts

soldiers; (ii) merchants, weavers, and priests or witch-doctors; and (iii) artists (story-tellers, dancers, musicians, &c.) and artisans. Artisans are in three groups, each of which may be subdivided, viz. smiths and stone-masons, whose wives are potters; carpenters and wood-workers; and leather-workers. Agriculturalists hold a high position because of their connexion with the divinity of the soil. It

should be emphasized, however, that many peoples have no such elaborate organization as that outlined in the preceding sentences.



FIG. 57b. Round Huts

Nevertheless, the true negro tribe is a community bound together very closely by the common interests of all its members. Each member has his duties, but each also has his rights; each must play his allotted part fairly and fully; for only in this way will the continuity of the tribal life be maintained. The village is an oasis of security in a desert of uncertainty, and it must be preserved alike from outside attack and from inward decay.

Property. Land is not privately owned in negro villages; but it is not altogether certain whether it is regarded as communal in precisely the European sense of the term. In former times there was land in abundance in most parts of West Africa, yet each tribe knew the



FIG. 58. *A Rectangular Hut*

boundaries of its own territory and guarded them jealously. Even in the case of stretches of primeval forest, the boundary was usually fixed. This had a practical significance in the right of gathering forest products and in the duty of maintaining the paths; but wars were frequently waged to prevent the occupation by strangers of lands of which only theoretical ownership existed. Two notions fundamental to the negro are that there is no land without an owner (*see p. 270*), and that no tribal lands can be alienated on the authority of the chief

alone. The chief, in this matter as in others, is a trustee and not an absolute ruler.

Although disputes about land are common, often in the past leading to wars, the African has always been ready to grant to out-

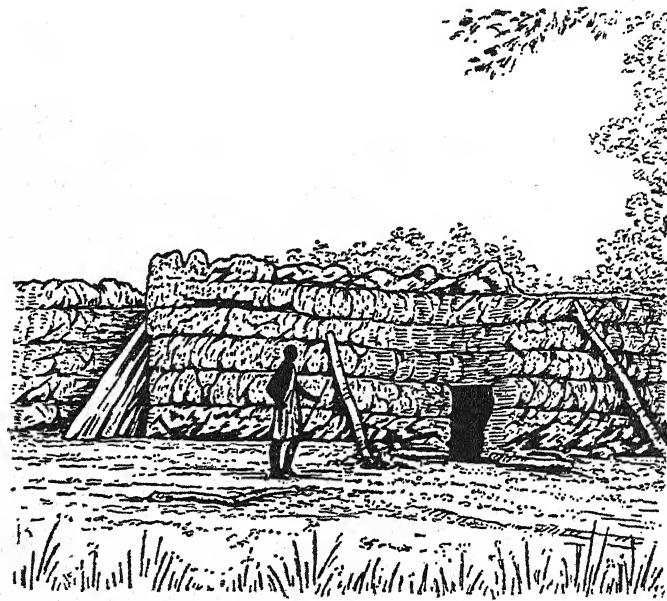


FIG. 59. *An Earth Hut*

siders the right to settle, subject to the payment of compensation to the head man. The idea of renting land to strangers is not, therefore, alien to the negro, so long as it is conceived as the privilege of a guest and so long as the stranger is loyal to the chief. In modern times much distress has been caused by the coming of Europeans with their own land laws, based on a totally different conception of the meaning of real property. They have often imagined that they have obtained absolute ownership of a piece of land by purchasing it from the local chief, and have failed to grasp that this type of transaction is, properly speaking, impossible. French West Africa has, perhaps, been less unfortunate in this matter than other parts of the continent. To the negro his land is not so much a valuable economic object as a solemn trust. It has been bequeathed to the present holders by their ances-

tors and it must be handed on, unimpaired, to their descendants. By some tribes it is worshipped. To all it is the resting-place of their forefathers and the home of their gods; so that it is understandable that its loss or sale is a grievous blow to the tribe. Against this view it may be argued that the slenderest knowledge of the history of West Africa shows that there have been many migrations of peoples from one area to another. It would, therefore, seem impossible for the land to have acquired its sacred character. Two points help to destroy this argument: firstly, the native on his migration carries his gods with him; and secondly, negro racial memories are very short. Many tales of native folk-lore, said to have occurred in the dim past, may be placed in modern times.

There is one qualification to the idea of tribal ownership of land. Even when the community is the theoretical landlord, every family cultivates a plot of land which is for all practical purposes family property and is inherited by the family. Crops are never communal, but are always the private property of those who have grown them; so with the cattle of pastoral people, even though their animals may graze on common land.

Chattels are always regarded as personal property.

Birth, Childhood, Marriage, and Death. The birth of a child is followed by a feast whose magnificence is in proportion to the status of the family. The witch-doctor makes protective amulets, e.g. rings for the ankles and pieces of wood to be tied round the wrists. Not long elapses before the mother is at work again. The baby is carried on her back, seated on a belt of cloth or skin. To feed him, she loosens her belt and passes the child's body under one of her arms. In some tribes, such as the Fons, the child is not officially named until it is between 4 and 8 years old. Then a second feast takes place, and the witch-doctor is once more called in to officiate. Twins are usually regarded with superstitious horror, and the children and the unfortunate mother are driven out of the village or even put to death. European governments have made strong efforts to end this practice, but they have not yet entirely succeeded in doing so.

The native education of young children is characterized by its leniency. The child is mainly left alone with its playmates, and is expected to find its place among the adults without very much interference. Children's games are largely imitations of adult activities, and in this way they grow up accustomed imperceptibly to genuine work. Girls begin serious work at an earlier age than boys, as their mothers soon need their help. The most important thing for children

to learn is the proper behaviour towards older people and towards their own equals. The age of puberty is marked by initiation rites. For boys they are of greater significance than for girls. By a series of ceremonies the boy is separated from his life as a child; he is brought into close contact with the past of his tribe and with the magical powers emanating from its ancestors; he becomes a full member of the community; and he is initiated into his rights and duties as a full-grown man. Where circumcision, extraction of the upper incisors, or other forms of mutilation are customary, these are performed at the beginning of the ceremonies, if they have not already taken place in early childhood. Sometimes the boy receives a new name. His elders instruct him carefully in the traditions, customs, and practices of the tribe, in sexual matters, and occasionally in agriculture and craftsmanship. Girls receive instruction from older women about sexual and marital life, and about their conduct towards their future husbands. In many parts the girls are grouped into schools and segregated for several weeks. In some tribes an excision or a similar surgical operation takes place. This is supposed to increase fertility and to facilitate delivery; but it often has an opposite effect, and may endanger the lives of the mother and the child.

Marriage is by no means a purely private affair, for by it one clan delivers one of its members to another clan for the purpose of propagating the tribe. The separation is not complete, for the departing bride or bridegroom does not cease entirely to be a member of his or her original clan or family. It follows, therefore, that both the contracting groups normally stand in a friendly relationship to each other; this is frequently expressed by the fact that the children of the one group regularly marry into the other. Men usually marry about the age of 18 or 20, women at 12 or 14. The marriage is customarily arranged by the parents and a bride-gift made by or on behalf of the bridegroom. This may take the form of some domestic valuables, of cattle, or of free labour on the lands of the prospective father-in-law. The wife herself estimates her value and the consideration which she will enjoy from her husband and his family according to the amount of the bride-gift paid for her. Payment for a wife gives some sort of right of proprietorship to the husband, but it does not mean that she is his slave; and every African woman would reject such a suggestion with scorn. Indeed, some tribes, such as the Ewe, allow the woman to own property independently of her husband and to engage in trade or manufacture on

her own account. The division of labour between men and women varies from tribe to tribe, but in most of them the women do a very large part of the work in the fields. This is, of course, beside domestic duties and the care of the children. Polygamy is almost universal. Each wife usually has a separate hut, and often the wives take it in turn to cook for their husband for four days each. As a rule, a man has as many wives as his economic condition will support. The woman first married is pleased to see her husband take a second or subsequent wives, as it means an improvement in her own position. She becomes the chief wife and exercises some supervision over the others. Furthermore, it means that there is less work to be done by each individual woman. From the man's point of view polygamy has several practical advantages. In pre-European times wives and slaves were for the agriculturalist the only field for the investment of capital. The man who had them in large numbers was rich and respected. Moreover, the wife's duties to her own original clan, mentioned above, can be better performed. In the cases of patrilocal marriages, i.e. where the wife goes to live in the husband's clan, she wishes to see her relatives from time to time; and such visits may extend over a period of weeks. If her father or mother dies, she must keep the death-bed vigil in the house in which the dead is buried. In some places the wife goes to her parents for some months before the birth of her child and there awaits her confinement. From soon after the beginning of her pregnancy up to the weaning of the child, a period of from two to three years, a husband must not have intercourse with his wife. All these considerations combine to make it seem advisable to a man not to be dependent on one wife only.

Divorce is more common than it used to be, but adultery is rarely the cause of it. Indeed, in a legal sense adultery is possible only on the part of the wife, for it is a damage to the husband's property, for which he can claim compensation. Persistent misconduct on the wife's part, personal injury, barrenness, cruelty on the part of the husband, or wilful desertion may provide grounds for the dissolution of the marriage. Divorce may lead to disputes or lawsuits about the repayment of the bride-gift. In modern Dahomey a husband keeps a careful account of what he spends on each wife, and at divorce the native courts will compel her to repay him. Every effort is usually made by the families of the husband and of the wife to settle their differences. For example, if a wife is barren, she can be sent back as worthless, and her clan will give another woman as a substitute. If a girl has been betrothed as a child, her husband may easily be forty

or more years older than herself. As a rule, the young girl will have to live in subjection to his older wives. On many occasions it happens that the girl refuses to submit to such unnatural compulsion, forms a liaison with a young man, and, despite the entreaties or threats of her parents, remains true to him. In such cases her family is in the painful position of being obliged to return the presents and other payments made years previously by her husband. Often, however, the girl obeys her parents, is married to the older man, but continues her relationship with the younger one; with the result that the guilty party, if discovered, has to compensate the husband.

The death of a man is followed by various ceremonies, including dancing and feasting. These may last for weeks. The first part of the funeral ceremony consists of the sobs and loud cries of the mourners. Very often the body is buried shortly after death, and the spirit is 'buried' any time up to one year later. As a rule, a man is buried under the floor of a hut rather than in an open graveyard. Beside the interred corpse are placed food, a pot of water, coins (if available), and a stick or other weapon, so that the dead man shall cut a respectable figure in the next world. The kind and amount of these offerings vary with the wealth and position of the man. The negro likes to be buried at his birthplace. If this is impossible, his relatives try to send some part of his body, such as a limb or even a toenail or some hairs, to be buried in his own home. Children are given solemn funerals among tribes who believe in metempsychosis, as the child's body may contain the spirit of some formerly powerful and honourable man. Men rarely wear mourning for their wives or display any other signs of grief, although sometimes they shave their hair. Each widow must remain ten days in her hut, dress in rags, weep, groan, and call out her late husband's name. She does not revert to her ordinary mode of life until her family ask her to do so. Daughters must help to keep the death-vigil of from one to six months in the hut in which their father is buried. A man's wives are inherited by his heirs, and it is not uncommon for a man to marry his father's widows, except, of course, his own mother. It is rare that a widow remains unmarried for much longer than a year. She is usually wedded to one of her late husband's relatives.

(c) *Animism*

Beliefs. Animistic religion takes many forms, but the following main ideas can generally be detected.

There is one supreme God, the creator of all things. He is usually

regarded, however, as being disinterested in human affairs, and is therefore not a proper or customary object of worship or prayer. He is neither loved nor feared. His qualities may be willingly admitted, but they exercise little influence on practical life. The supernatural powers which affect the ordinary man are multitudinous in number and diverse in form. Many of them are thought to be minor gods or even emanations from the principal deity. Some, like the Earth Goddess of the Ashanti, have great and extensive power; others are natural forces, such as thunder; others, again, are purely local. Some of the Sudanese tribes have myths about their gods reminiscent of those of ancient Greece. For example, the Sky God (or Sun God) married the Earth Goddess, and their children are the principal spirits who dispense life, death, good, and evil. In most cases the spirit is thought to have a powerful influence over a place, a natural object, or a tribe. These spirits must be propitiated and sometimes worshipped. In some parts this matter is in the hands of a kind of organized priesthood. Ceremonies, open or secret, take place, and sacrifices are made in huts containing the image of the god or of the animal which represents it. If a hut is not used, a special place may exist where the god is believed to be particularly approachable, such as, for a forest spirit, the foot of a particular tree.

The individual has a soul, which is not always bound to one body, but at death may pass on to another. A man's soul is capable of leaving his body for short periods during his lifetime. If a man dream of being in a far country, he really has been there; for his soul has left his body during the hours of sleep. It is possible for a magician to capture the soul of a sick man which has escaped and is perched on a nearby tree, and, having captured it, to restore it to its owner's body. Some tribes regard a man as having two souls, a 'vital breath' and a 'dynamic spirit'. The former is under subjection to the latter, and has of itself no intelligence and no will. It leaves the body when the 'dynamic spirit' has been vanquished by a more powerful spirit, and the death of the body results. It is widely believed that a man's death must have been caused by some human agent, and it is the duty of the dead man's relatives and friends to find the criminal.

Ancestral spirits are also worshipped, as they have influence in the other world. Behind this worship is the conception that a village or a tribe is a community of the living and the dead, of which the living are not necessarily the more potent. The dead must be cared for as well as the living, while the preservation of tribal customs

ensures the welfare of those as yet unborn. Beliefs about the exact status of spirits of dead men in the other world differ considerably. It is not certain that they are regarded as being immortal in the ordinary sense of that term. On the contrary, it seems to be believed that, if a tribe dies out, its spirits will die too; this affords another demonstration of the unity of the dead and the living.

The death of a chief or other notable involves a most solemn funeral, and the strictest mourning for widows and other relatives. His tomb will be carefully maintained and the greatest respect shown to it. Many objects which were used by him in life will become sacred after his death. Sacrifices of domestic animals and offerings of food and drink may be made to his spirit for years after his decease. In former times human sacrifices were often made as well, as it was felt that a great chief should be suitably attended in the spirit world; but European governments have succeeded in almost entirely stopping this custom.

Morality. There is no necessary connexion between animistic religion and morality. The gods and spirits themselves are not usually good, and they can be tricked and bribed in the same way as could those of the Ancient World. Like them too, they are often capricious and fickle, with personal friends and personal enemies. They do not require justice and mercy but rites and propitiation. The incentive to moral behaviour, therefore, is seldom or never supplied by the fear of a god or spirit, still less by the love of him. It is more to be found in the pressure of tribal customs and in the desire for social good.

Magic. For the negro there is no sharply defined boundary between the natural and the supernatural. This is partly to be explained by his egocentric attitude. He feels himself to be the centre of his world, and he values objects in his immediate environment according to their ability to harm or to help him. He transfers to them his own human qualities, his needs, his desires, his emotions, and his capacity for action; so that he treats them in some ways as he does his fellow men, trying to gain their support and assistance. Men change into animals, and animals into men. A buffalo may trade in the market as a human being, and then on his way home change once more into a buffalo. A man may roam round the village at night as a leopard, be shot, and then be found next day as a man, lying wounded on his mat. An animal may be talked to as to a man. Food is often placed before the skulls of slain animals; and they are prayed to tell their living companions in the forest how well they

are being cared for, and to advise them likewise to allow themselves to be shot by hunters. The eyes of a shot leopard may be bound, so that it cannot see the man who killed it and take vengeance on him. It is quite natural for a man to beg forgiveness of a tree by making a sacrifice to it before felling it; he excuses himself by saying that the village chief, who must be obeyed, has laid this unpleasant duty on him.

The essence of West African magic is a belief in power, and a magician is a man who can organize and draw upon that power on behalf of himself or of some other man. Magic may be used for good or for evil, and the ritual treatment of certain substances by persons with special powers is thought to have effects which a European would term supernatural. A part of the body or of a natural object represents the whole. A leopard's tooth gives some power over a leopard, a man's hair or nails power over the man. Portions of a lion may be treated and eaten to produce courage in war. The fertility of the soil may be connected with the sexual life of the chief or the fertility of his wives. Among many tribes the planting of seeds is done by women; for they have the gift of fruitfulness and can transfer it to the crops. A charm to assist travellers may be made from the branch of a tree overhanging a difficult climb on a frequented path; if this branch is grasped by travellers to help them on their way, its power is constantly increased by them; therefore its wood has power which may be employed by means of a charm made from it. Old people, especially if they are of high rank, possess a large amount of power. The mere fact of their continued existence is a proof of power, for it has enabled them to nullify all the hostile forces against them. Their magical influence does not cease with their deaths, so that an old man is usually buried in his own hut. In this way his clan has control over him and thereby over his strength and goodwill.

This absence of clear distinction between the natural and the supernatural does not mean that the negro is incapable of deducing natural effects from natural causes. For example, he is fully aware that the successful cultivation of a field depends upon such factors as the type of soil, the amount of rainfall, the soundness of the seed, and the quality of his own work. The highest human skill, however, cannot avert drought or plant disease; and this is where magic can play its vital part. In other words, ordinary contingencies can be met by natural means, extraordinary only by supernatural.

Belief in casters of spells is widespread, and illness and death may well be caused by them. The fetish priest or 'ju-ju man' is called in

to identify them, and to provide more powerful magic as an antidote. Here again the borderline between the normal and the super-normal, between sorcery and medicine, is hard to draw. Fetish priest and doctor are one and the same man; he may cure a stomach-ache by a purgative and by a magical incantation; and which of the two or what combination of both removes the pain is not a question that would occur to the patient. Magic is frequently used for redress or for revenge. Nails driven into the wooden image of an enemy bring about his death. The processes by which power is produced are to a large extent a technique which, for everyday affairs, may be acquired by anyone. Certain men and women, however, possess special aptitude and ability. Their art consists in knowing for each case the suitable ingredients, methods, and treatment. There is something sacred about this, for the knowledge required has been handed down from the earliest times, perhaps from some god who originally gave the skill to a former member of the tribe. For the magical act to be fully effective it must be performed precisely in the traditional manner. Indeed, in some parts there appear to be colleges or schools where men and women are trained in these arts.

The fetish priests claim to be able to foretell the future by tracing lines in sand, by throwing pebbles on to the ground, or by explaining dreams. They also make amulets from a variety of substances, including human bones. The masks, musical instruments, charms, and other apparatus used in the making of magic are usually kept in a fetish-hut, guarded from the sight of strangers by a wooden figure at the entrance.

The term 'fetish' (from the Portuguese *feitiço*—an image or holy relic) has fallen out of favour with modern anthropologists. Professor Seligman, for example, says: " ‘Fetish’, so common a word in books on West Africa, is purposely avoided; at best it represents a particular aspect of animism, the belief in separable indwelling spirits in animate and inanimate objects, including some made by human hands.' Nevertheless 'fetish' is a useful word and one commonly used in British West African circles. *Ju-ju* or *gri-gri* may come from the French *joujou* (= a toy) or from the Mandingo *gru-gru* (= a charm), which itself may have come from the French. 'Totem' refers to an animal or plant species, of which all individual members are considered to be of one blood with all the members of a human group, usually a clan. The counterpart of this idea is seen in the 'taboo'. Each man has inherited from his father a taboo, generally an animal which he must not kill and whose flesh he must not eat. It is believed

that people who have the same taboo are related and must treat one another as brothers. M. Delafosse recorded an instance of this in 1912.

'A Moshi of the Pima clan, an animist and a savage, who had never left his native country before, found himself at St. Louis, and met there a Ouolof of the Noliaye clan, who was a Moslem . . . and relatively civilized, and who on his part had never been in the Moshi country. The Pima did not understand one word of Ouolof, nor the Noliaye one word of Moshi. After some moments, by signs which they alone could note, this Moshi and this Ouolof recognized each other as members of one clan, and immediately the Ouolof took the Moshi, whose home was 1,700 miles away, under his protection.'

Secret Societies. Under this heading come a large variety of associations with no necessarily common function. The element of secrecy varies enormously. Some societies are open to any man who can pay the necessary fees. Others are recruited privately, have an elaborate ritual of initiation, use a peculiar ceremonial and symbolism, and possibly speak a private language. Their secrets may not be revealed upon pain of death. Some of these organizations are directed towards ends that are not only illegal from the white man's standpoint but also anti-social from the point of view of the negro. The latter form of secret society is in the minority, however, and the vast majority are mutual benefit clubs. Membership thereof gives social distinction, and is regarded as a reasonable method of employing the wealth of the rich and of helping the poor. The most notorious of the worse type of society was the Human Leopard Society, which caused great trouble to the Government of Sierra Leone in the early years of the present century. The religious rites may be inspired by a god, a beast, or even a powerful charm. In many cases annual festivals are held, and masks are worn by the initiates. The titles of these societies are frequently derived from occupational guilds, one of the highest being that of blacksmith. Some of them perform useful work from a social point of view. For example, the fishing of an under-stocked river will be prohibited, or the exhibition of a society's signs will prevent the destruction of a crop or the digging of yams at the wrong season.

(d) Europeanization

Much of what has been written above must be read in conjunction with Chapter VI, which shows some of the changes wrought by the coming of the French. Much good has been done. Tribal warfare

has ceased, the worst practices of paganism have been abolished, health has been improved, and the native's feet have been set on the path of French civilization. Yet it would require a high degree of complacent self-satisfaction for any European to suppose that the coming of the white races to West Africa has brought unalloyed blessing. In the realm of politics the black man has found himself to be part of the white man's world, and less and less remote from that world's affairs. The Senegalese no longer fights his own enemies in the next village: he is sent to fight France's enemies in the next continent. In the economic sphere the native may abandon his traditional methods of agriculture and grow special crops for the European market; he is thus attached to the world economy, and financial disasters in distant lands may make his crops unsaleable. If he is employed on the railway or in the factory, his whole mode of life is completely different from that of his forefathers. Instead of a communal life, based on personal service, he leads an individual one, based on money. He may come into close contact with the European and observe his faults. If he is an animist, he is separated from his tribal gods and their worship. The incentive to moral behaviour mentioned above no longer exists, and his mind may come to contain a hotchpotch of half-digested scientific notions, a belief in magic, and the fear of evil spirits. These tendencies have been very strongly developed in recent years in other parts of the continent, and French West Africa has not escaped them. The supreme test of French colonial policy will be in its capacity to effect, with the minimum of disorder and friction, the vast changes necessary to make all its native peoples contented and useful citizens of the modern world.

The Peoples of the Coast. In addition to the effects noted in the previous paragraph, European intervention in West African affairs has had an important ethnological result. This has been the creation of a series of coastal strips whose inhabitants do not lead the life of the desert, the savanna, or the forest. They are the living consequences of the slave trade, broken fragments of peoples, returned freed slaves, and descendants of raiders and pirates. Many of them have some European blood in their veins, and all of them are in contact with European ideas and ways. They are numerically strongest in Liberia and in Sierra Leone, but French West Africa has its share of them. As these peoples are usually detribalized, dress is a compound of European and native clothing and property an individual rather than a family affair. Many of them are agriculturalists. Others live in the towns and provide labour for the docks and fac-

tories. Family life is altogether less highly organized than among true negroes and family loyalties make fewer claims.

Personal Contacts with Europeans. To the European visitor or resident daily contact with the negro will bring with it problems of right conduct for himself and of right treatment of the native. These problems are clearly incapable of any precise solution, as their individual conditions vary widely; but the following considerations may be borne in mind. It is impossible fully to understand any negro without some knowledge of his language, and every attempt should be made to avoid what a French writer calls the '*table d'hôte* psychology' of the casual tourist. The negro's methods of work are not those of the European. He is seldom unemployed, but he is equally seldom unready to leave a particular task for a short or a long time. This is partly a direct result of his membership of a society which has been static for generations and partly an indirect result of the tropical heat to which his body is physically and chemically adapted. The influence of the sun is also shown by the negro's whole manner of existence, by his custom of covering his body with a thin layer of oil, by his need of frequent periods of rest, and by his slight powers of physical endurance in comparison with his size. All this means that the negro cannot be forced for long to adopt the white man's rhythm of work. In addition, though ready to welcome and to help strangers, he is in reality reserved, and he tends to distrust those who are the opposite. He is usually cheerful, but, when things go wrong, he can be intensely depressed. He will respond to kindness more readily than to threats. At the same time, he is a poor democrat, preferring to obey firm orders rather than to go into committee to decide upon a future course of action. Indeed, in many ways he resembles a child, and in many cases should be treated as such.

III. GENERAL CONSIDERATIONS

(a) Arts and Crafts

Islam forbids the representation of men or animals, so that in the Moslem parts of French West Africa fine arts have their expression mainly in geometrical decoration, including designs on cloths, goldsmiths' work, and leather.

Animist art is closely connected with religion, and its products are many and interesting. Statues, images, masks, and musical instruments are found in most diverse shapes and forms, some agreeable and some grotesque. Where Islamic influence is perceptible, e.g.

among the Moshi, negro art is characterized by the extreme simplification of line and rigidity of form. The forest tribes have simple and supple art forms with realist tendencies. On the Guinea coast long contact with the outside world has brought an even freer style, less

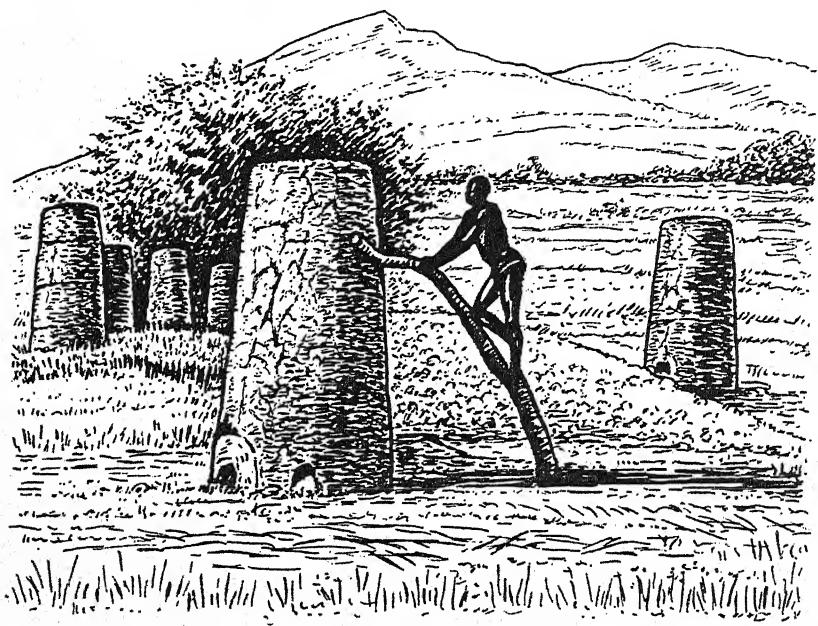


FIG. 60. *A Native Iron Furnace*

closely connected with religion. In Dahomey, for instance, there are produced brass and copper statuettes of familiar types such as the cultivator, the hunter, or the mother and child. Carved ivory is also an important artistic product. No race could do such work without great ability in the plastic arts.

West African iron-work has long been of importance (Fig. 60). The Mandingo technique of smelting was noted by Mungo Park in 1798. The furnace was a circular tower of clay about 10 feet high and 3 feet in diameter, surrounded in two places by withes to prevent crumbling through heat. Near the level of the ground were seven openings. Into each of these were placed three tubes of clay, and the openings were again plastered up in such a manner that no air could

enter the furnace except through the tubes, which were opened or shut in order to regulate the fire. These tubes were made by plastering a mixture of clay and grass round a smooth wooden roller, which was withdrawn when the clay began to harden. The dull reddish-gray ironstone was broken into pieces about the size of a hen's egg; and the furnace was prepared by casting in a bundle of dry wood, over which was placed a layer of charcoal. Following this, the workers put down alternate layers of iron and charcoal until the furnace was full. Fire was applied through one of the base tubes and blown for a time with goatskin bellows. The furnace was in a state of heat for three days; then, after several days of cooling, the iron appeared in the form of a large irregular mass with charcoal adhering. Further purification in the furnace was necessary before this could be worked into tools or other articles.

The final products of the native iron-workers include swords, spears, razors, tongs, hoe-blades, and other implements.

The Mandingos and the Hausa are the leading leather-workers of West Africa, if not of the whole continent. They make ornamental harness, cushions, pads, pouches, scabbards, and sandals. The leather is often dyed, and strips of it used in *appliqué* work.

Calculations. Few negroes, uneducated by Europeans, can count above 80, and few of them can tell their own ages. Days may be counted by cutting tally-sticks or by making knots in a piece of string; but the passage of longer periods of time is usually reckoned by reference to rainy seasons or to crops. In business matters women are often superior to men.

(b) Christianity

Christian missions have been less active in French West Africa than in other parts of tropical Africa. This has been due partly to the difficulties of penetration from the coast and partly to the fact that so many of the inhabitants are Moslems. It is computed that there are some 100,000 Christians in French West Africa proper and 70,000 in Togo.

Protestantism. In 1937 there were 56,534 Protestants, 33,188 of them in the Ivory Coast and 22,340 in Dahomey. The total number of missionaries was 171, and the two largest societies at work were the Methodist Missionary Society (British) and the Société des Missions Évangéliques de Paris. There were also some American missionaries, mainly in French Sudan.

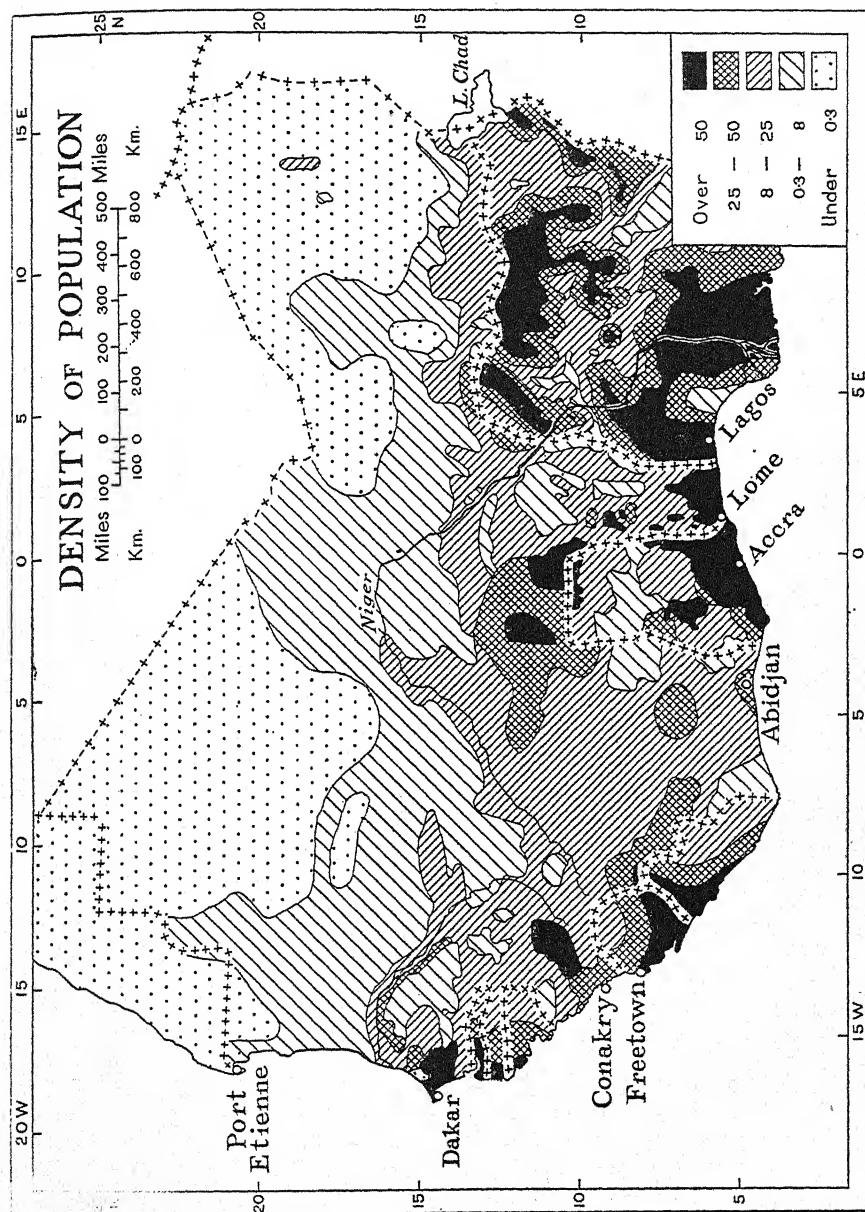
Roman Catholicism. The Roman Catholics are scattered throughout the country south of the Niger, with particular concentrations in Dahomey. Much of the work is done by members of the Ordre de Notre Dame d'Afrique (White Fathers). There are seven dioceses. One is the Prefecture Apostolic for Senegambia, and the others are the Vicariates Apostolic of Guinea, Sudan, Dahomey, Lower Ivory Coast, Middle Ivory Coast, and Upper Ivory Coast. The episcopal seats are at Dakar, Conakry, Ségou, Porto Novo, Grand Bassam, Korhogo, and Ouagadougou.

IV. GROWTH AND DISTRIBUTION OF POPULATION

French West Africa and Togo have an area of approximately 1,844,828 square miles and in 1937 they had a population of 15,725,529, giving an average density of 8·52 persons per square mile. The corresponding figures for France in 1936 were 212,659, 41,907,056, and 197·00.

Distribution

The figure for average density is more than usually deceptive, as there are large tracts of country, especially in the north, which are almost uninhabited. For example, the 328,190 square miles of Mauritania have only 370,764 people in them. Fig. 61 shows that the most densely populated regions (over 50 per square mile) are the coastlands of Dahomey and Togo, the forest clearings of the upper Volta basin, the plains east and south-east of Dakar, and the southern slopes of Fouta Jalon. Other relatively dense concentrations (between 25 and 50 per square mile) are found on the coastlands of the Ivory Coast and French Guinea, along the left bank of the Senegal, and in northern Togo. There is, of course, a close connexion between density of population on the one hand and climate and vegetation on the other; and forest, savanna, and desert impose their individual limits on human settlement. The forest negro can grow enough to support life on but a small patch of fertile land, while the pastoral nomad of the savanna requires a much larger area on which his animals may graze. Northwards from the Niger, where savanna is rapidly replaced by scrub and then by desert, the physical conditions conspire to make human life difficult, and the great wastes of the Sahara have but few inhabitants. Population figures for French West Africa and some adjacent countries will be found in Appendix A. Comparisons based on these must, how-

FIG. 61. *Density of Population per Square Mile*

ever, take into account the large areas in French territories which are desert or otherwise uninhabitable. Even so, it is obvious that, physical region for physical region, British colonies have a much denser native population than French. The Gold Coast, for example, has 43·16 persons per square mile, Dahomey 29·58.

Town Populations (Fig. 62). In 1931 there were 18 towns in French West Africa and Togo with more than 10,000 inhabitants each, and 23 with between 5,000 and 10,000, giving a grand total of 450,029 persons. This represents 2·86 per cent. of the whole population, and it is, therefore, abundantly clear that the overwhelming majority lives outside the towns. There is little industrial activity or mining except for gold (*see pp. 288-90*), so that there is small reason for any great aggregation of men or women. The towns themselves are treated in more detail in Volume II, but four main groups may be distinguished: seaports, river towns and route centres, caravan towns, and native centres. The history of ports has been one of fluctuating prosperity, and the principal ports of to-day are not those of two and three centuries ago. The importance of the river towns, such as Bamako, has been increased by the building of railways and of roads, while Thiès, for example, owes its present size entirely to its railway workshops. The old caravan towns, such as Timbuktu and Zinder, play a much smaller part in West African economy than they did formerly, and their modern status reflects the decline of trans-Saharan trade. The largest native town is Abomey (15,049), and others of note are Dabou and Bobo Dioulasso. There are very few towns in the forest belt itself, but some entrepôts, e.g. Kankan and Bouaké, lie at its northern edge. There is also an appreciable number of towns in the savanna, especially in the Moshi country. No native towns in French territory, however, can compare in size and importance with Ibadan or Kano in Nigeria.

Growth

Most of the conjectures of early explorers and travellers overestimated the size of the population. Fairly reliable figures for some of the towns were obtained before the end of the nineteenth century, but the first official estimates for French West Africa as a whole were made in 1906. These gave a total of 8,418,000. In 1911 the figures, including those for Mauritania (which had been under French protection since January 1909), were 10,456,115 natives and 8,957 Europeans, 10,465,072 in all. In 1915 the total was declared to be 12,438,567, but by 1920 it had fallen to 11,464,377. The first complete census, though, of course, taken by the rather unsatisfactory methods described below,

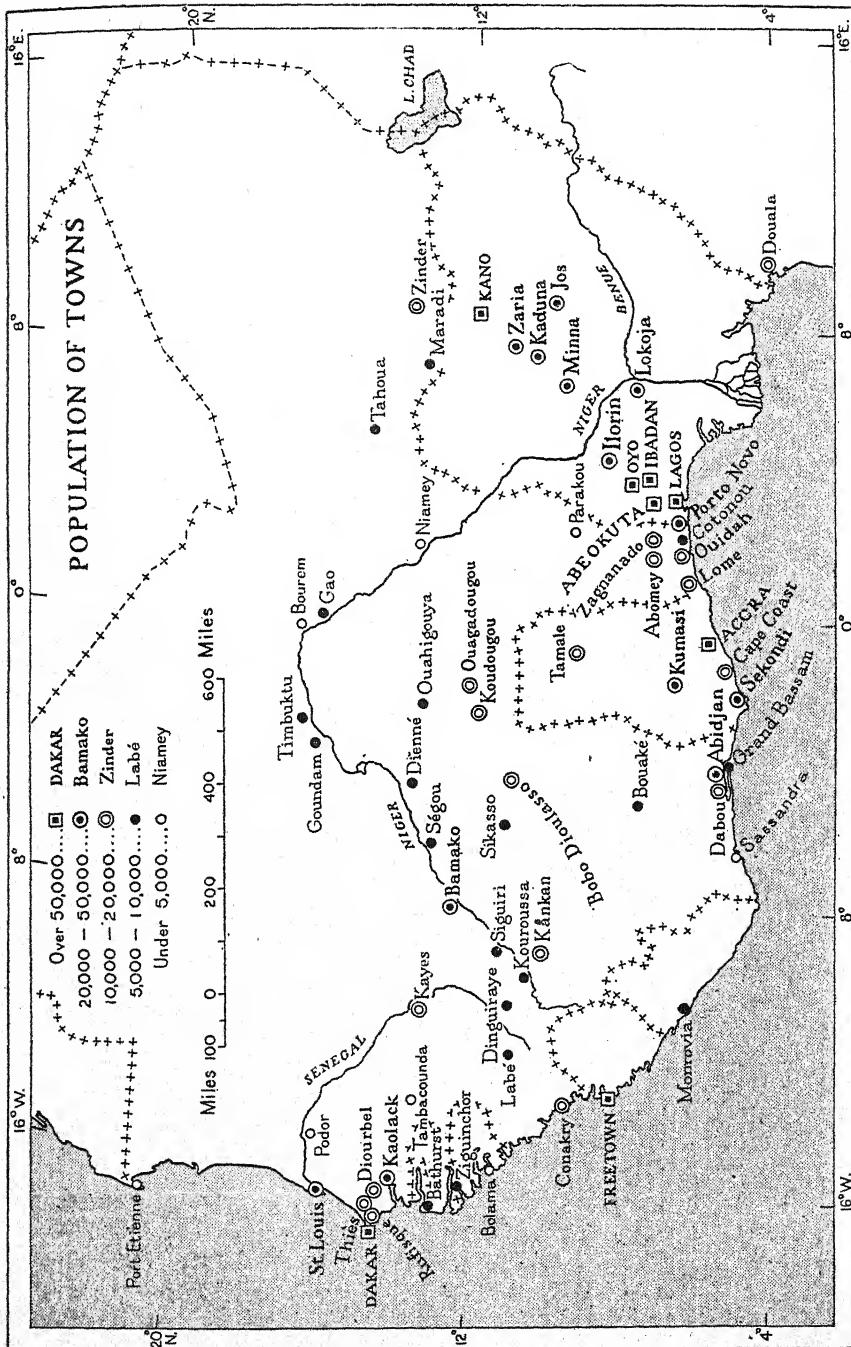


FIG. 62. Population of Towns

was that of 1921, and its results, together with those for 1926, 1931, and 1937, are shown in Table I.

TABLE I

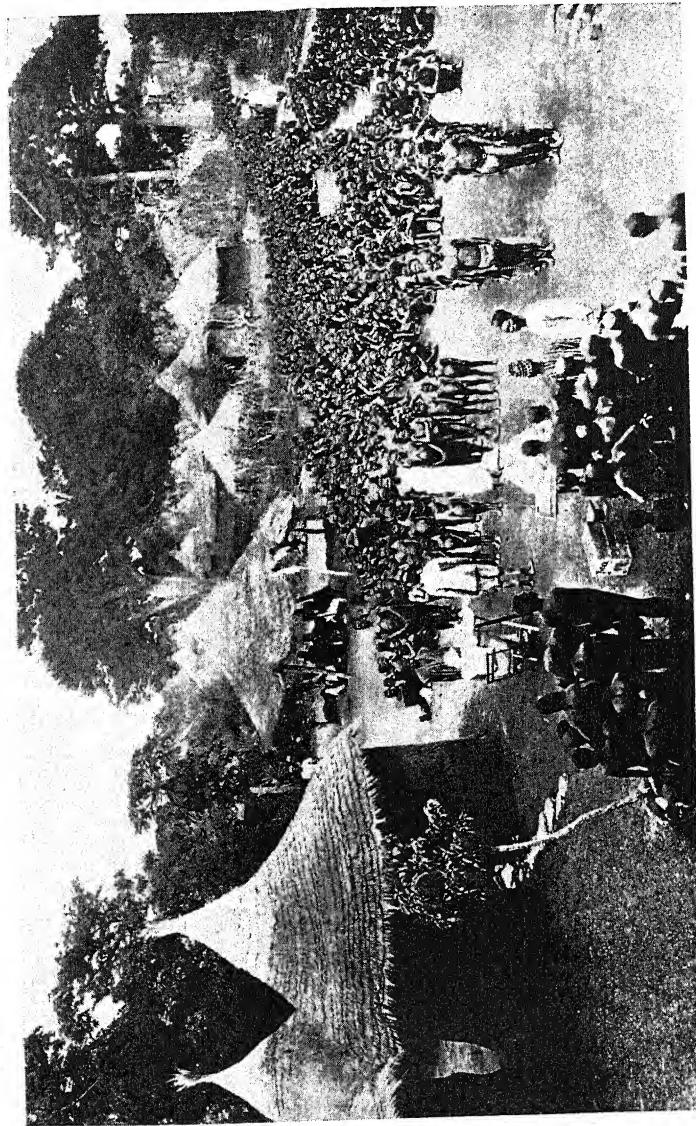
Census Figures for French West Africa and Togo, 1921-1937

	1921	1926	1931	1937
Natives . . .	12,948,144	14,288,420	15,309,504	15,698,386
Europeans . . .	8,866	15,644	21,734	27,143
Total . . .	12,957,010	14,304,064	15,331,238	15,725,529

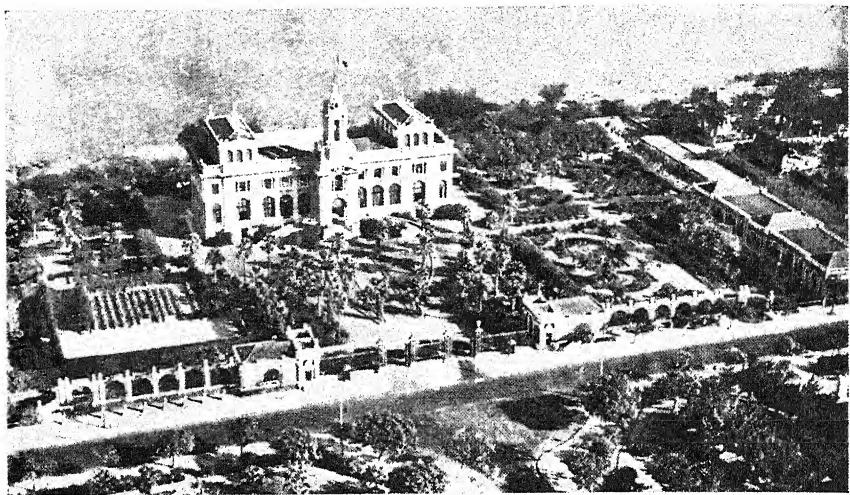
N.B. The figures for 1931 and 1937 are not entirely correct because, included in them, are those for Togo, taken in 1932 and 1938 respectively.

These results show increases of 10·24 per cent., 7·63 per cent., and 2·29 per cent. respectively. Further details for 1931 and 1937 are given in Appendix B. In many parts of Black Africa the population is stationary or decreasing; if this is the case in French West Africa, the increases given above would be explained by the growing efficiency of the machinery of census.

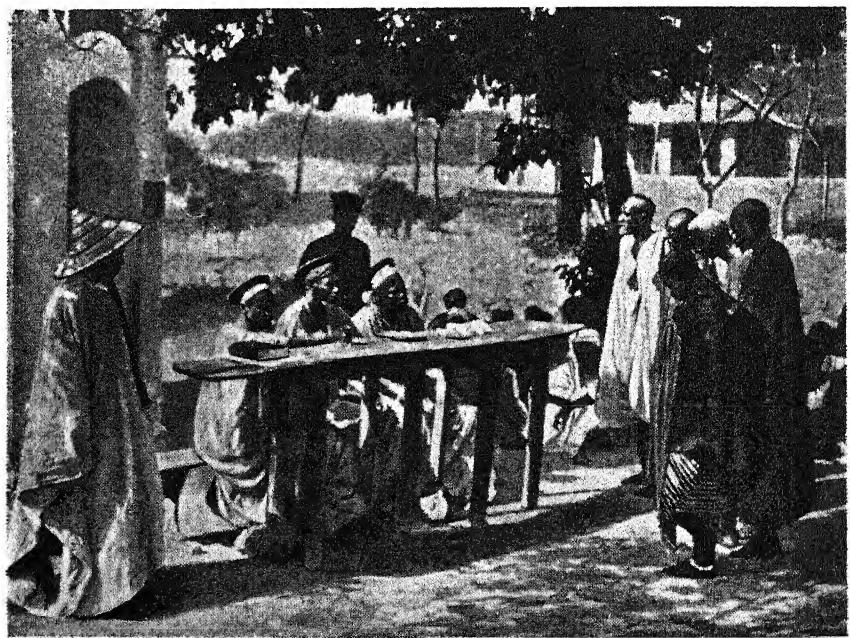
Methods of Computation. In each case the figures quoted for population come from a census or from an official estimate, but they cannot be assumed to be as accurate as those obtained from a western European country. The vast majority of the people is illiterate, so that the duty of making a return cannot, as it is in the United Kingdom, be devolved upon the householder: the government official is entirely responsible. The liability of all adult males to military service and to the payment of direct taxation provides valuable data, but this does not affect old people or children. When a census is taken, many persons may be away from their homes for one reason or another, and so avoid being counted. Others connect enumeration with the payment of taxes, and so evade the census if they can. Others, again, object to it because of superstition or custom. Furthermore, part of the population consists of nomads, who may unintentionally escape the census official or who may move from one colony to another. With these factors in mind, many administrators consider that the census figures are too low. In the Congo the Belgians add 12 per cent. for those who escape the census, and on this basis the population of French West Africa and Togo would be some 17,500,000. On the other hand, since many of the figures are obtained, even to-day, by somewhat haphazard methods, the margin of error may well be on the opposite side. The official returns for French West Africa do not show the very large fluctuations exhibited in many other African colonies, and, for general purposes, they may be assumed to be reliable.



57. *Census-taking in Togo*



58. *The Governor-General's residence, Dakar*



59. *A native tribunal in Senegal*

Vital Statistics. An order of 29 May 1933, amended in 1934, made compulsory the registration of the births, marriages, and deaths of certain classes of natives. These include inhabitants of municipalities, members of the fighting services, government officials, holders of trading licences, and native chiefs. Centres for registration exist at the headquarters of administrative sub-divisions, and any other native may register voluntarily. French citizens are also, under French law, compelled to register births and deaths. In 1933 the then Governor-General, M. Brévié, put forward a scheme to train a number of civil servants as *agents recenseurs*, but at present little seems to have been done to put this into execution. Even if the letter of the law is strictly obeyed, these registrations do not cover a very large percentage of the population, and accurate deductions are difficult to draw from such material.

Movement. There is no organized emigration or immigration, but it is reasonably certain that there is some movement across the borders from French territories into British. Individuals cross to trade, to find game, or to escape military service; whole families occasionally travel; but the movement of a complete tribe is extremely rare. The coastlands of the gulf of Guinea are more fertile and economically more prosperous than the interior, and an enterprising young native may well go south to seek his fortune. Movements within French West Africa itself include the wanderings of the nomadic herdsmen of the savanna and desert lands. Many villages of isolated tribes prove that there have been extensive tribal migrations in the past, but there is little to suggest that this continues at the present time. Neither industry nor agriculture demands great numbers of seasonal or temporary workers, so that men seldom leave their homes for long periods, as they do in many other African lands.

Europeans

Numbers. Table II gives the figures for the growth of the European population since 1912 and for the proportion of Frenchmen therein. Even though the numbers have grown considerably in recent years, the Europeans, as shown by Appendix B, form only 1/580th part of the total population. This is clearly a negligible fraction from a numerical point of view. Most of these Europeans are government officials, soldiers, traders, or missionaries, and few of them bring their wives and children with them or spend more than a very short time in the country. Almost one-third of them live in Dakar alone, and large areas of the interior have no unofficial white residents.

TABLE II

*Numbers of Europeans in French West Africa and Togo,
1912-1937*

	<i>Europeans</i>		<i>Of whom French</i>	<i>Total</i>
	<i>F.W.A.</i>	<i>Togo</i>		
1912	9,935	..	8,905	9,935
1917	8,914	..	8,020	8,914
1921	8,655	210	7,742	8,865
1926	15,399	245	11,099	15,644
1931	21,088	646 ¹	14,400	21,734
1937	26,614	529 ²	18,188	27,143

¹ 1932.² 1938.

Settlement. Broadly speaking, there is no part of French West Africa suitable for permanent settlement by Europeans. Modern medical science has removed some of the terrors from the 'white man's grave', but there are few white men who can endure prolonged residence in West Africa without deterioration of physical or mental health. The savanna lands have the most suitable climate, but they lack the cool nights which make the highlands of Kenya and Tanganyika tolerable to Europeans. From an economic standpoint, the chief occupation for colonists would be some form of agriculture, and in this they would find it difficult to compete with the natives. At the same time, as the country becomes more fully developed, there will be a growing demand for Europeans to fill administrative and executive positions, and the European population may well increase to a considerable degree.

APPENDIX A

FRENCH WEST AFRICA AND ITS NEIGHBOURS

	<i>Year</i>	<i>Area sq. miles</i>	<i>Population</i>	<i>Density per sq. mile</i>
French West Africa . . .	1937	1,822,855	14,944,830	8.20
Togo	1938	21,973	780,699	35.48
French Equatorial Africa . . .	1936	867,700	3,423,015	3.95
Gambia	1931	4,068	199,520	49.05
Gold Coast	1940	91,843	3,965,702	43.16
Liberia . . . .	..	43,000 ¹	1,250,000 ¹	29.07
Nigeria	1939	372,674	20,641,814	55.39
Portuguese Guinea	1938	13,944	415,220	29.78
Sierra Leone	1931	30,169	1,793,530	56.13

¹ Estimated.

THE PEOPLES

APPENDIX B
POPULATION BY COLONIES, 1931 AND 1937

	Area (sq. miles)	Population, 1931			Population, 1937		
		Natives		Europeans	Total	Natives	Europeans
		Europeans	Natives				
Dahomey	43,243	1,110,940	966	1,111,906	1,288,115	1,013	953
Dakar	66	47,423	6,559	53,982	8,470	6,728	2958
French Guinea	96,911	2,234,692	2,276	2,236,968	2,062,099	3,428	1,923,16
French Sudan	591,122	2,853,655	2,003	2,855,658	3,633,384	2,689	2,057
Ivory Coast	184,170	4,461,082	3,452	4,464,534	3,977,658	3,801	3,635,073
Mauritania	328,190	323,498	321	323,819	370,413	351	3,981,459
Niger	501,933	1,949,619	414	1,950,033	1,809,132	444	370,764
Senegal	77,220	1,579,176	5,007	1,584,273	1,659,956	6,418	1,809,576
TOTALS	1,822,855	14,560,085	21,088	14,581,173	14,918,216	26,614	1,666,374
Togo	21,973	749,419 ¹	646 ¹	750,065 ¹	780,170 ²	529 ²	2158
TOTALS	1,844,828	15,309,504	21,734	15,331,238	15,698,386	27,143	..
							15,725,529
							8·52

¹ 1932.² 1938.

CHAPTER VIII

ADMINISTRATION

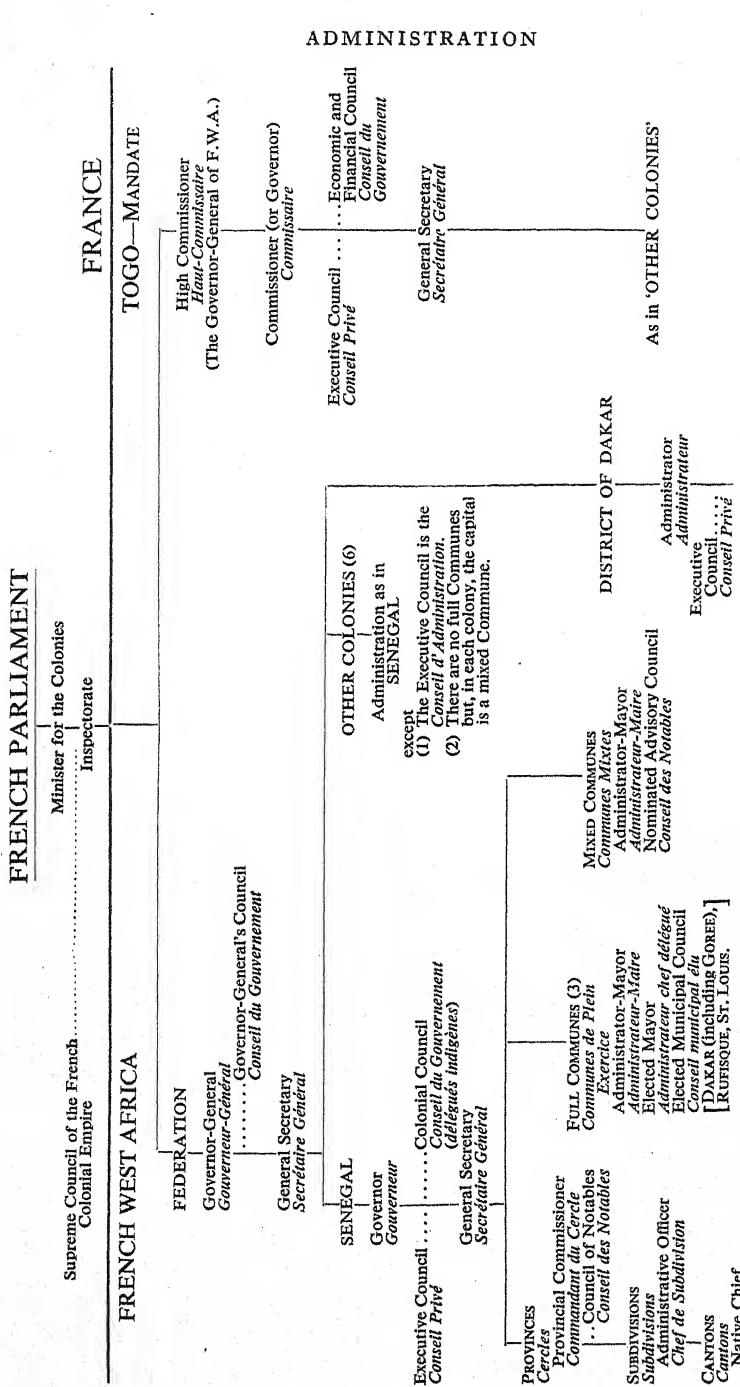
THE FRENCH COLONIAL SYSTEM

French and British Policies

THE French Colonial Empire is governed from Paris to a far greater degree than is the British Colonial Empire from London. It is ruled as a unity, and the interests of any one part must not impair the benefit of the empire as a whole. The ultimate aim of French policy may not unfairly be said to be the complete Gallicization of every French subject, so that all may have a full share in the blessings of French civilization. British policy, on the other hand, at least since the Durham Report of 1839, has been so to develop the human and material resources of each colony that it may be completely autonomous. The two clearest examples of the achievement of these diverse objects are probably Canada and Algeria. The former is a self-governing dominion whose only constitutional link with the United Kingdom is the Crown: the latter is an integral part of metropolitan France. Modifications of the French system are more apparent than real. The Old Colonies of Martinique, Guadeloupe, and Réunion have councils elected on a wide franchise, and in recent years the governors-general of other colonies have been given more power; but the main fabric of government remains largely unimpaired.

Assimilation and Association

The general principles of French colonial administration are centralization, subordination, and uniformity, but these principles have been put into practice by two somewhat different methods, assimilation and association. The former was the policy of the nineteenth century, and by it native law and customs were to be abolished, true French departments progressively established, and all adult inhabitants enfranchised as full French citizens. Towards the end of that century, however, it became clear that this policy was not immediately practicable. The native saw his old institutions attacked, with but little substitute provided for them. The pace of the proposed changes was too great, and a new plan was made. This was the policy of association. The present aim of this is to preserve native institutions, and it has some resemblance to the indirect rule found in many British

FIG. 63. *The French Colonial System*

colonies. The British method, however, is to encourage native states to develop along their own lines as far as possible; but the French method is still to induce the natives to adopt French institutions and ways of thought. This is a more gradual process than previously, but the change is one of means rather than of ends.

Legislation

The right to legislate for the colonies was conferred on the Emperor by a *Sénatus-Consulter* of 3 May 1854, and the President exercises it as the Emperor's successor. The French Parliament, however, can and does legislate for the colonies on occasion, and in 1893 asserted its right to tax them. Legislation is, nevertheless, not normally by parliamentary laws but by presidential decrees. Such decrees are usually enacted on the advice of the Minister for the Colonies, to whom they may have been recommended by a colonial governor. A decree may require slight modification to suit local conditions, and in each individual colony it comes into force as the result of its promulgation by an administrative order (*arrêté*).

Tariffs. Until the time of the Second Empire the trade of French colonies was restricted to that with the mother country and navigation was confined to ships flying the French flag. Under Napoleon III these rules were relaxed, but the colonies were not allowed to draw up their own customs tariffs. Further modifications were made by laws of 11 January 1892 and 13 April 1928, and colonial possessions are now divided into two groups: assimilated colonies, which come into the fiscal system of metropolitan France, and non-assimilated colonies, which have their own individual tariffs and duties. French West Africa and Togo both come into the second class. Tariffs are drawn up in France, and the most that the colonial governors can do to change them is to make representations to the Ministry for the Colonies. Except where prohibited by international agreement, preferential treatment is accorded to France.

The Ministry of Colonies

History. The earliest French colonies were administered by the nominees of the Crown or of the interested private persons or companies, and the first attempts at organization were not made until 1669. In that year Colbert placed colonial affairs under the jurisdiction of the Ministry of Marine. They remained thus for more than two centuries, but in 1881 an Under-Secretaryship of State for the Colonies was created. This post was at first attached to the Ministry

of Commerce, but later reverted to the Ministry of Marine. By the law of 20 March 1894 a Ministry for the Colonies was set up, and since that date it has had a continuous existence. It administers some four-fifths of the French overseas possessions, Algeria being under the Ministry of the Interior and French Morocco and Tunisia under the Foreign Office.

The Supreme Council of the French Colonial Empire. Attached to the Ministry for the Colonies are several councils, of which the most important is the Supreme Council of the French Colonial Empire (*Conseil Supérieur de la France Outremer*). The function of this body is to give advice on such colonial questions and proposals as may be submitted to it by the Minister. Originally constituted in 1883 as the *Conseil Supérieur des Colonies*, it ceased to function after three years, but was revived in 1920. In 1937 it was reconstituted under its present title, and now sits in two sections, economic and legal. On both sections sit the Senators and Deputies of those colonies represented in Parliament, delegates elected every four years by French citizens in other colonies, and members nominated by colonial governors to represent native interests. As far as French West Africa is concerned, a Deputy is sent from Senegal and delegates from Dahomey, French Guinea, French Sudan, and the Ivory Coast.

To the Economic Section the Minister nominates representatives of various interests both at home and in the colonies, and to the Legal Section two members of the Council of State and various legal experts. The names of the two sections indicate the scope of their activities. Each meets twice a year, and, if required, the two may combine in plenary session under the presidency of the Minister.

The French Colonial Service. The French Colonial Service is organized into two divisions, Higher and Subordinate. Members of the former (*administrateurs des colonies*) have the terms of their service fixed by presidential decree. Before entry they spend three years at the Colonial Service Training College (*École Nationale de la France Outremer*), which was founded in 1889. After a short period of probation they become Assistant Administrators (*administrateurs-adjoints*). This grade is divided into three classes, and efficient officers may become Administrators (first, second, or third class) and eventually Chief Administrators. Secretaries-general no longer form a special class, but are drawn from the ranks of the Service. The posts of governors-general and of governors may be filled by promotion from below or by appointment from outside. French West Africa and French Equatorial Africa are organized as a single unit as far as their

Administrators are concerned, and transfers may be made from one colony to another. Such terms as *chef de région* and *commandant du cercle* refer to the post which an officer is filling locally and not to his rank in the Service.

Members of the Subordinate division (*agents des services civils*) have their terms of service fixed by local administrative order. They are divided into three classes and are not liable to intercolonial transfer.

There is no colour bar in either division, and, indeed, one of the objects of French educational policy is to train natives to become Colonial Servants.

The Inspectorate. A feature of the French colonial system unknown to the British is the Inspectorate. Officers of this branch visit each colony at frequent intervals and have very wide powers of inquiry into the working of the Colonial Service. Though they have no executive authority, they have access to all official documents, even the most confidential, and report direct to the Minister for the Colonies. The Inspectorate is a closed service, and its members cannot change to the administrative staff. In addition to the main Inspectorate responsible to the Minister, other inspectors report to the governors of individual territories.

In 1937 there were 3,790 European members of the Colonial Service in French West Africa and 129 in Togo.

THE GOVERNMENT OF THE FEDERATION AND THE COLONIES

French West Africa

French West Africa is a federation composed of the seven colonies of Senegal, French Guinea, the Ivory Coast, Dahomey, French Sudan, Niger, and Mauritania. The head of the whole Federation is the Governor-General, and each of the other colonies has its own Governor. The District of Dakar and its dependencies, some 66 square miles in area, though geographically in Senegal is politically independent of it. Since 1924 it has been under an administrator responsible directly to the Governor-General.

Though all the other French settlements in West Africa had at various times been under the control or the influence of Senegal, the first definite federation was not constituted until the decree of 16 June 1895. This made the Governor of Senegal *ex officio* Governor-General, and gave him a somewhat vague and ineffectual control over the other colonies. In 1902 the office of Governor-General was separated from the governorship of Senegal, and the seat of government became

Dakar. The present constitution of the Federation rests on the decree of 18 October 1904, as modified by several subsequent decrees, the latest of which is that of 22 June 1933. The Governor-General is the depositary of the powers of the Republic throughout the colonies of the Federation, and he alone has the right of correspondence with the Home Government. Though the decree makes no specific mention of any military functions, all French governors are, as in the British system, nominally responsible for the military defences of their colonies, though not in personal command of the naval, military, or air forces. The Governor-General has a general supervision over, and directs the policy of, the separate colonies, whose budgets must be approved by the Governor-General in Council. With the exception of those appointments reserved to the French Government, the Governor-General appoints to all civil offices throughout the Federation, though he may delegate these powers to the subordinate governors.

The division of powers between the federal and the colonial governments is not very precisely made, but it may be said that matters of general policy and of finance are the concern of the former, matters of administration and of local policy the concern of the latter. In recent years there has been a tendency for the federal government to extend the range of its activities. This has been due partly to its own financial authority and partly to the gradual extinction of the suspicion with which it was originally regarded by the colonial governments.

The Machinery of Government

Administrative Departments. Immediately subordinate to the Governor-General is the Secretary-General, and, by an order of 30 March 1933, the headquarters administration is arranged in the following manner. There are five Departments (*Directions*), those of the Cabinet, of Personnel, of Finance, of Political and Administrative Affairs, and of Economic Services, and three Inspectorates-General, of Public Works, of Medical and Health Services, and of Education. All except the first two, whose heads are directly responsible to the Governor-General, are under the control of the Secretary-General. The main function of these services is to advise the Governor-General and to indicate to the Colonial Governors the broad lines of policy. The last named are entirely responsible for the conduct of their own services.

Councils. The Governor-General is assisted by a Council (*Conseil du Gouvernement*), consisting of official and of non-official members.

The official members are the Secretary-General, the Commander-in-Chief, the Governors of the Colonies, the Administrator of Dakar, the Commissioner for Togo, and senior members of the Colonial Service. The non-official members are the Deputy for Senegal, the delegates to the Supreme Council of the French Colonial Empire, the president and some elected members of the Colonial Council of Senegal, and delegates from the other Colonial Councils and from Chambers of Commerce and certain other bodies. There are, in all, some forty members. The Council meets once a year to hear a statement of past and future policy from the Governor-General. It is statutorily bound to discuss the budgets of the Federation and of the separate colonies and to be consulted about loans, taxation, and public works. Its recommendations go to the Minister of Colonies, by whom they are confirmed by decree. If, however, the Minister takes no action within three months, his approval is assumed without further formality.

There is also a Standing Committee (*Commission Permanente*) of the Council. This is composed of the official members of the Council itself who are resident in or near Dakar, the Deputy for Senegal, and representatives of the Colonial Council of Senegal, the municipality of Dakar, and of the Dakar Chamber of Commerce. This Standing Committee meets once a month, and, in case of emergency, can assume the powers of the full Council.

In addition to the Council there are also advisory councils for Health, Railways, Mines, Education, Technical Education, and Market Prices. This last body (*Commission Supérieure des Mercuriales*) deals with questions of duties, prices, and trade statistics.

Finance. A decree of 31 December 1912 laid down the principle that the chief financial officer in French colonies (*trésorier-payeur*, or, in the smaller colonies, *trésorier*) should be nominated by the Minister of Finance. The distribution of the higher financial staff among the various colonies is the joint business of the Ministers of Finance and the Colonies, but the posting of serving officers in any given colony is managed according to ordinary Colonial Service practice by the local governor-general or governor. He too prepares the budget and passes it through his council for approval by the Minister. The West African Federal Government, the Governments of the Colonies, and the Government of Togo, which enjoys financial autonomy, have *trésoriers-payeurs*. The financial system is described in more detail in Chapter XI.

Armed Forces

The Army. The Governor-General, who is nominally responsible

for defence, has a Council of Defence consisting principally of military officers. The troops in the French Colonial Empire are divided into seven groups. Of these French West Africa forms one. It is commanded by a Général de Division, having the rank of Commandant de Corps d'Armée. The troops are divided into two brigades together with certain divisional elements. Most of the troops are stationed in Dakar, in Senegal, and in French Sudan, but each colony is garrisoned, and the deserts are patrolled by camel corps, organized in mobile patrols (*groupes nomades*). Military law is administered by courts martial, of which the most important sits at Dakar.

As early as 1828 two companies of Ouolets were enlisted in Senegal and sent to Madagascar, and in 1857 Faidherbe first enlisted the lineal ancestors of the famous Senegalese tirailleurs of to-day. There was no machinery for conscription before 1912, and, indeed, it was not until 1917 that voluntary recruiting failed to produce the numbers required. French West Africa's part in the war has been described in Chapter VI. The present system of conscription is based on a decree of 30 July 1919. Each colony provides an annual quota, and in each province lists are prepared containing the names of all who have reached the age of 19. These men are assembled in their districts before boards composed of an administrator, a military officer, and a doctor. Those not exempt, either for physical infirmity or for other good reasons, are divided into two categories by ballot. In 1925, out of 125,000 men of the age of 19, 10,000 were placed in the first portion and 24,000 in the second portion, the remainder being exempt.

The first portion serves in the army for 3 years, and then passes into the reserve for another 12, but any man on the completion of his 3 years may voluntarily re-enlist up to a total of 15 years' service with the colours, at the conclusion of which he will receive a small pension. Ex-soldiers are also considered favourably for civil service posts and for appointments as chiefs.

The second portion of each year's contingent can be called up for military service at any time in case of necessity, or may be used for labour on public works.

Conscripts are liable for service elsewhere than in their own country. Normally, after a preliminary training in West Africa, they are sent to France. After further training they serve for two years in French Morocco, Algeria, or Syria, and there are six regiments of Senegalese tirailleurs stationed in France itself. The remainder of their service is spent in West Africa, where there are 15,000 out of a total force of about 40,000.

In 1928 the garrison of French West Africa was estimated at thrice the number of the whole of the Royal West African Frontier Force, and conscription is undoubtedly a serious drain on the man-power of the federation. Many French administrators and medical officers consider also that the sojourn abroad is good for neither the health nor the morals of the West African soldier, and, whatever may be the military advantages to the Empire as a whole, would gladly see the whole system abolished.

The foregoing regulations apply only to subjects, French citizens being bound by the conscription laws of metropolitan France.

The Navy. Dakar is an important naval base, but the few natives in the French Navy are all volunteers. It is, however, a condition of admission to the schools of navigation and marine engineering at Dakar, that candidates, if required to do so, should serve for a period in the navy.

Police. A civil police force under the administrative service is officered by 98 Europeans, but no recent figures of the native rank and file are available. In 1928 these numbered some 15,000.

Togo. In Togo the terms of the mandate forbid conscription, but there is a company of militia numbering 184, rural police numbering 223, and an urban police force of 32 in the town of Lome.

The Colonies

Councils

In each colony there is at least one advisory body. In Senegal, which has a slightly different constitution from the others, there are two councils, the Executive Council (*conseil privé*) and the Colonial Council. Both consist of official and of non-official members; both must be consulted about the budget; and the Executive Council must also be consulted about loans, concessions, and public works. In each of the other colonies there is an Executive Council (*conseil d'administration*), similarly composed of official and of non-official members, and similarly bound to be consulted. Each council has a standing committee like that of the Governor-General's Council. The legal authority for all these councils is the decrees of 4 December 1920 and of 30 March 1925.

Territorial Divisions

Each colony is divided into provinces (*cercles*) under provincial commissioners (*commandants du cercle*). Most provinces are divided into districts, each under the charge of a junior administrative officer.

Boundaries of colonies are regulated by decree, but divisions within each colony are made by order of the Governor-General.

In 1938 the number of provinces in the various colonies was as follows:

Senegal	15
French Sudan	17
French Guinea	18
Ivory Coast	20
Dahomey	8
Niger	14
Mauritania	9
District of Dakar	1

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A decree of 21 May 1919 laid down that, in any province where the natives were considered sufficiently advanced, a Council of Notables might be created. These councils consist of from eight to sixteen chiefs or other notables, nominated for three years. They are consultative only, but they must be approached by the administrator in charge concerning native taxes, allocation and execution of forced labour (*prestations*), native trading licences, and local public works. They may be also consulted on any other matter which the administrator may think fit to bring before them. At least 14 of these councils have been created in Senegal, 12 in French Sudan, and 6 in Dahomey.

The French *commandant du cercle* is much more the ruler of his area than is the British Provincial Commissioner. The latter is responsible generally for good order in his province, and it is his duty to make suggestions for its development which will require to be carried out by the Public Works and other technical departments, but, except in cases of urgency, he does not give their local representatives direct orders. These ordinarily come from the head of their own department by departmental channels. The French system definitely subordinates the representatives of the local technical departments, who are frequently members of the subordinate division, to the administrative officer. For example, the administrative officer is primarily responsible for the systematic increases of production demanded by the *mise-en-valeur* policy.

Togo

French Togo is held under mandate from the League of Nations, and the High Commissioner is the Governor-General of French West Africa.

The Machinery of Government

There is no Secretary-General, but his place is taken by the Commissioner of the Republic for Togo. He has his civil service, the secretariat for Togo, but, for the sake of economy, some officers have also held posts in Dahomey. As has been noted above, the Mandated Territory is financially independent of French West Africa. It has an Executive Council and also an Economic and Financial Council. The former must be consulted on all questions of taxation, loans, and concessions, and may, of course, be consulted on any other matter that the High Commissioner or his deputy may submit to it.

Territorial Divisions

An order which came into force on 1 January 1939 restored to Togo its six provinces of Anecho, Atakpame, Klouto, Lome, Mango, and Sokode. During the financial depression these had been combined into three, the Northern, Central, and Southern.

*Native Organization**Aims and Methods*

As has already been pointed out, the modern French conception of native ruling institutions differs fundamentally from that adopted in British colonies. The French aim is to introduce French civilization as rapidly as possible, using native institutions as far as they are the best instruments for the purpose, but otherwise regardless of their fate.

French colonization in West Africa began under treaties with chiefs: the colonizers were traders carrying on their business in the territory of a foreign power on whose protection they relied. In early days even the recognition of French suzerainty by a native power was not intended to compromise its authority over its own subjects. But, owing to the spread of western civilization and to the abuse of power by the chiefs themselves, the French, like the British, were gradually faced with the dilemma of ending or mending native power. The British chose indirect rule or control, the French abolition. Hence modern French chiefs are government agents and nothing else. In 1917 Governor-General Van Vollenhoven said: 'There are not two authorities in the province, the French authority and the native authority: there is only one. The native chief never speaks or acts in his own name, but always in the name of the provincial commissioner and by express or tacit delegation from him.'

Other things being equal, the French prefer a member of the local

ruling family, as likely to become a more influential local agent of their will, and in Togo village chiefs are chosen from a list of three submitted by the village itself. Though it is not usual, chiefs are at times transferred from one area to another, and the French Government thinks nothing of suppressing chiefs or regrouping villages, irrespective of tradition. This policy has tended to break up the larger native states. In 1924 the Emirate of Sine (Senegal), then 300 years old, was abolished after the death of an emir who had always been thoroughly loyal to the French. This was done on the ground that, in the interest of the economic development of the country, the inhabitants should not be allowed to 'follow a separatist tradition, but on the contrary they should deliberately adapt themselves to the system of administration which makes for the prosperity of the Colony'. The country, which contained about 150,000 inhabitants, was split up into five cantons.

Chiefs

Though conditions and titles may vary slightly in the different colonies, chiefs in French West Africa are usually divided into three classes: village chiefs, canton chiefs, and provincial chiefs.

The Village Chief. The village chief, the humblest member of the hierarchy, is usually nominated by the provincial commissioner after consultation with the village elders. His functions are (*a*) to arrest offenders and take them to the superior chief or the local administrative officer, (*b*) to take measures to protect the village crops and nurseries from the depredations of beasts, (*c*) to keep the village and its surroundings clean, and minor roads and bridges in good repair, (*d*) to report epidemics and infectious diseases, and carry out the orders of the authorities with regard to them, (*e*) to attempt to settle disputes between his villagers without the intervention of the courts, (*f*) to collect the taxes, and (*g*) to supervise the work of his village under the communal labour system. He is assisted by a council, constituted in accordance with native custom, and his remuneration usually consists of a percentage of the taxes he collects.

The Canton Chief. The canton chief supervises a group of villages, varying in number in different parts of the country. In some provinces the cantons are subdivided into smaller groups of villages, each under a regional chief.

The canton chief keeps up-to-date lists of residents and taxpayers, informing the local administrative officer of changes. He, and not the village chief, is the agent of the Government for military conscription. He allots the proportion of taxes and communal labour among the

constituent villages of the canton, and generally supervises the work of his village chiefs. His council consists of his regional and village chiefs and of native notables, both civil and religious. It may also include his secretary, and it is by no means a stereotyped body. In some cases the canton chief receives a percentage on the native taxes in his area; more often he has a fixed salary; and occasionally he has both. He is appointed by the Governor on the recommendation of the provincial commissioner. The Togo order, which is typical of the rest, lays down that canton chiefs are to be appointed from the following classes in order of preference:

- (a) From the old families of the locality, who would by tradition hold such a position.
- (b) From local notables or functionaries, literate if possible, who are well disposed to the Government.
- (c) From those men who have had at least four years' service as secretaries to canton chiefs.
- (d) From the native civil service.

The Provincial Chief. In the past the provincial chief has been the paramount chief of a large tribe, but the modern tendency is to suppress this class. Its members are recruited from the canton chiefs or from other native notables. They are paid fixed salaries of varying amounts, and many of them are also supplied with secretaries paid by and responsible to the Government. They are assisted by provincial councils, which are composed mainly of canton chiefs.

Training. After many vicissitudes, the school founded by Faidherbe at St. Louis for training interpreters and sons of chiefs has returned to its original function. This school gives a general education, and its curriculum is admirably calculated to turn out good French civil servants; whereas the similar school at Tabora in Tanganyika gives a training definitely calculated to fit future rulers for their duties. The pupil, on leaving the school, performs his military service, and then enters the office of a provincial commissioner as clerk and interpreter. When a vacancy in a chieftaincy occurs he is eligible for appointment.

Urban Government

Full Communes

In Senegal there are three towns with full self-governing powers (*communes de plein exercice*), Dakar (which now includes Goree), St. Louis, and Rufisque. Each of these has an elected council from and by whom the mayor is chosen. Full communes normally have

very wide powers to administer police, education, sanitation, roads, markets, lighting, and allied matters, but the Government of Senegal has unusually large authority in these respects.

Mixed Communes

A decree of 4 December 1920 declared that mixed communes may be established in areas which are sufficiently enlightened to benefit by their establishment and sufficiently prosperous to support them. They are under the presidency of the local administrative officers, who for this purpose take the title of administrator-mayors. On paper they have the same powers as the full communes, but the real power remains with the Government through the administrator-mayors. These officials have the duty of executing the regulations relating to police, hygiene, public works, and administration of property. They control revenue and execute the budget. On their advice the Governor nominates all municipal employees, thus preventing the nepotism which is not unknown in full communes.

Three classes of mixed communes are recognized by French law:

- (a) Those of the first degree, in which all the councillors, composed of equal numbers of citizens and subjects, are nominated by the Governor.
- (b) Those of the second degree, in which the councils are elected by franchise restricted to French citizens, native government employees, and persons with certain business or land-owning qualifications.
- (c) Those of the third degree, in which the councils are elected on universal suffrage.

A council customarily numbers from eight to twelve. By 1936 only three communes of the second degree had been established in French West Africa, and none of the third degree. In 1937 there were twenty-seven mixed communes all told.

Native Communes

An order of 16 January 1921 provided for the establishment of native communes. These differ very slightly from mixed communes of the first degree. Each has a council (*commission des notables*) composed of from five to ten nominated members, who are collectively responsible for the execution of those administrative orders which refer to their commune.

Communes of all types may themselves be divided into wards

(*quartiers*), each having its own ward chief, who is advised by a ward council.

Togo

A decree of 6 November 1929 extended this system of urban government to Togo, where Lome has a mixed commune and Anecho a native one.

Chambers of Commerce, Agriculture, and Industry

Chambers of Commerce. Chambers of Commerce deserve special mention among French West African institutions, for, as semi-official bodies, they play a part unknown to their namesakes in British colonies. Their constitutions, duties, and powers are defined by an order of 31 May 1930. This order recognized existing chambers, but declared that no new chambers could be formed without the Governor-General's authorization. This is given by an order, which fixes for a new chamber the number of its members (usually from nine to fifteen) and the area which it is to serve.

Similar regulations are in force in Togo under an order of 1 June 1938; but in this case the vote for membership of the chamber is extended to foreigners.

Members are elected for a term of four years by the owners or agents of business firms in the locality. Where the local agricultural and forestry interests do not justify the formation of a separate chamber of agriculture, they are represented by a specially elected section of the Chamber of Commerce. Members of the chamber must be the local heads of their establishments and be able to speak French. Subjects as well as citizens have a vote. The chambers are financed by an additional licence tax which every commercial house must pay. Chambers of Commerce must be consulted on proposed changes in commercial legislation or customs tariffs and on other imposts and charges which may affect business interests in their areas. They can also proffer spontaneous advice on these and kindred subjects. Each chamber is a corporate body which may hold property, and do business in its corporate capacity. For example, the French Chamber of Commerce of Turcoing owns a large sheep farm in Macina, while at Kaolack the local chamber has undertaken large improvements in the port. It has already been noted that Chambers of Commerce elect members to some of the Councils.

Chambers of Agriculture and Industry. Chambers of Agriculture and Industry are composed partly of elected representatives of culti-

vators and partly of delegates of native provident societies and similar organizations. While these chambers are consulted by the Government, they have no representation on its Councils.

LAW AND JUSTICE

Systems of Law

The administration of justice in French West Africa is based on the following types of legislative enactments:

- (a) French Acts of Parliament (*Lois*).
- (b) Presidential Decrees (*Décrets*).
- (c) Orders (*Arrêtés*) of the Governor-General and the Governors of the separate colonies.
- (d) French Codes.
- (e) Administrative Law (*Droit Administratif*).
- (f) Native Customary Law.
- (g) Moslem Law.
- (h) Native Disciplinary Law (*Indigénat*).

The first four have already been mentioned.

Administrative Law

Administrative Law is a system, found in several continental countries, whereby cases involving government officials are dealt with by special courts. For example, if the driver of a military lorry is involved in an accident, the case is dealt with by an official court (*conseil du contentieux administratif*). In many French colonies this tribunal is formed by the Standing Committee of the Governor-General's Council plus two legal members; but in French West Africa and its component colonies it was separated from the aforesaid Council by a decree of 4 December 1920. The Central Tribunal is presided over by the Secretary-General, and two councillors of the Court of Appeal and two senior administrators with legal qualifications are nominated as members each year by the Governor-General. In the individual colonies the Governor presides over a court composed of three administrative officers and one magistrate. In Togo, under the decree of 6 March 1923, the tribunal which deals with administrative law is composed of the head of the Public Works Department, two magistrates and an administrative official, with the Commissioner of the Republic as president.

All this is entirely alien to English ideas, but, in the form it has

assumed in modern French law, Administrative Law is surrounded by safeguards which make its exercise far less of an invasion of private rights than is often supposed.

Citizens and Subjects

The inhabitants of French West Africa who owe allegiance to France are divided into two classes: French citizens (*citoyens français*) and French subjects (*sujets français*).

French Citizens. French citizens are those of any race who were born French or who have acquired citizenship by naturalization. Since 1848 all persons born in the old communes of Senegal, viz. St. Louis, Rufisque, and Dakar, have been French citizens; and in 1916 citizenship was extended, primarily for greater ease of military conscription, to all their descendants. The result is that, out of the 80,500 native citizens of French West Africa, over 78,000 are inhabitants of Senegal. Other candidates for citizenship must be over 18 years of age, monogamous, of civilized habits, and educated (themselves and their children) in French. They must either have been in French employment for ten years, or have given other evidence of devotion to French interests, or be the fathers of children by civil marriages with French women. They must also have performed their military service. Holders of the Military Medal or Croix de Guerre can obtain citizenship by a simple declaration. French citizens are subject to the penal code, the civil code, the commercial code, and the general body of French law and not, whatever their race, to native customary law in general; but a decree of 20 November 1932 restored to native citizens their original condition in such matters as personal status, property, succession, and marriage. On these questions Moslem citizens can at their option apply to Moslem courts, where they exist, or to the French Courts. In colonies such as Senegal, which have parliamentary representation, French citizens alone enjoy the franchise, and in other colonies they alone have a vote in the election of delegates to the Supreme Council of the French Colonial Empire.

On 23 April 1923 a Resolution of the Council of the League of Nations recognized the principle that inhabitants of a mandated territory could become subjects of the mandatory power, and under a decree of 7 November 1930 (replacing earlier provisions on the same subject) natives of Togo can obtain French citizenship on similar terms to those prevailing in French West Africa. Neither here nor elsewhere is the privilege eagerly sought after.

For French citizens, and for European and other aliens who are deemed to be of equal civilization to French citizens, there exist courts modelled closely on those of France. These administer French law, and also have jurisdiction where one party is a citizen and the other a native.

French Subjects. The vast bulk of the population is composed of native Africans amenable to native law and custom, including Moslem law where it is applicable. Naturally, customs, such as slave dealing, which the Government considers immoral or barbarous, are excluded. In no circumstances can a subject escape from native law in criminal matters, or in questions concerning his family relations or his holding of real property unless that property is held under a registered title.

In civil matters other than the above one native may summon another before a French Court. At the outset the defendant can successfully object to the jurisdiction. If he does not do so the case will proceed, but native custom, which must be proved as a fact in French Courts, will be applied.

Moreover, under a decree of 2 May 1906 two natives may make a contract on certain subjects such as rent, by which both undertake that the particular contract shall be construed by French law. To be valid, such a contract must be in writing and registered; and any dispute arising on its construction will then be decided by the French Courts. Notwithstanding, French Courts are little used by the native. They are probably far from his home, and undoubtedly more expensive than the native tribunals. Rough and ready though the justice of native tribunals may be, it is undoubtedly justice, and of a type that the native understands.

Native Disciplinary Law

In addition to offences made triable by the courts, subjects are bound by a system of disciplinary penalties known as *l'Indigénat*. Such acts as obstructing the collection of taxes or the execution of forced labour, refusal to appear when summoned by the administrative officer of the district, harbouring persons wanted by the police, illegal wearing of uniform, and manifestations threatening public peace, are punishable by an administrative officer summarily without trial, with a maximum penalty of 15 days' imprisonment or 100 francs fine. The officer must report the occurrence, and the penalty may be remitted by the Governor, but, by the time that this decision is announced, the offender may well have served any term of imprisonment imposed. This system has caused much discontent in

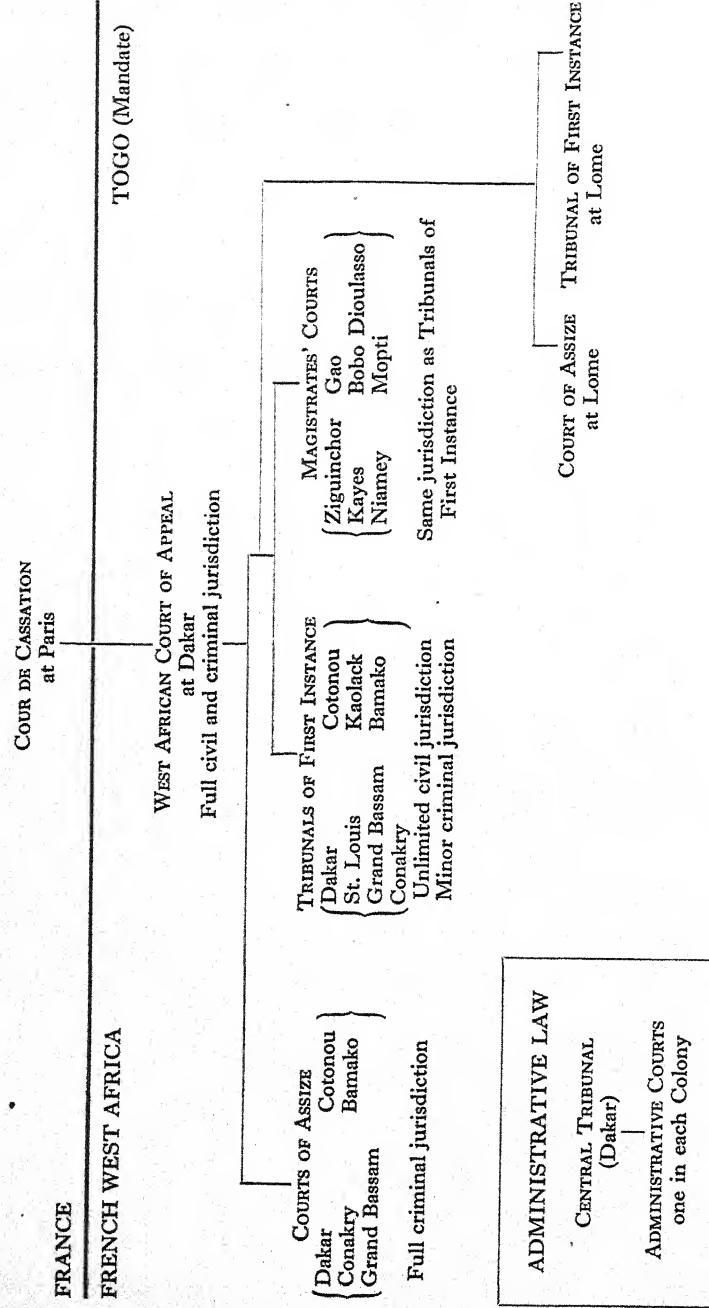


FIG. 64. French Law

educated native circles, and has been the subject of considerable criticism in the Colonial Council of Senegal. An order of 20 June 1925 reduced the number of offences punishable under the Indigénat from fifty to twelve. Togo is also subject to this system.

Absence of Penal Code. It is noteworthy that, throughout French West Africa, natives are subject to no penal code providing definite maximum penalties for definite offences. The maximum powers of punishment of even the Tribunals of the First Degree are very large, and, wielded by an inexperienced president, may bear hardly on an offender. In French Equatorial Africa heavy sentences automatically come for review before the *Chambre d'Homologation*. This is not so in French West Africa, though the Attorney-General of each colony may bring before the Colonial Court of Appeal any criminal case that he thinks fit. To do this, however, he has to obtain his information from the elaborate system of monthly returns of cases heard by the lower tribunals. Appeals are otherwise left entirely to the aggrieved parties.

Courts of Justice

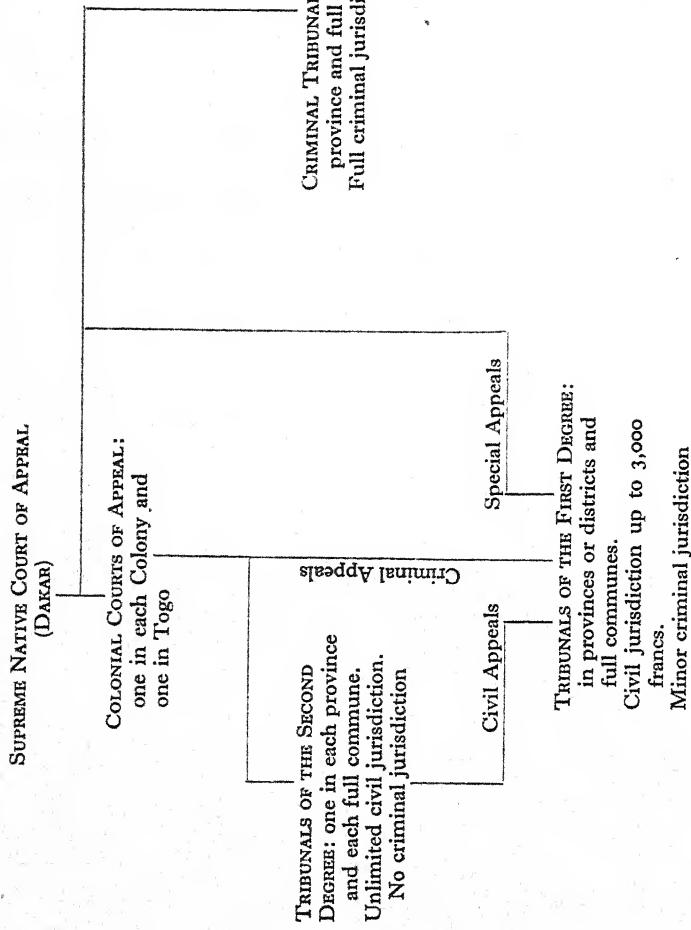
Courts Administering French Law (Fig. 64)

Under the decrees of 10 November 1903, 16 November 1924, 22 August 1928, and 17 July 1930 there are 19 courts administering French law (*justice française*): 6 magistrates' courts, 7 tribunals of first instance, 5 courts of assize, and 1 court of appeal.

The West African Court of Appeal. This sits at Dakar and hears appeals, both civil and criminal, from all courts in the Federation and in Togo. Its full staff consists of a president, a vice-president, and seven councillors, all of whom are professional members of the judicial service. It is usually composed of three members, but five sit in cases of grave importance. From it, in certain cases, there lies a further appeal to the *Cour de Cassation* at Paris.

Courts of Assize. For criminal cases there are five Courts of Assize, respectively at Dakar, Conakry, Grand Bassam, Cotonou, and Bamako. In Senegal these tribunals are composed of three members of the Court of Appeal; elsewhere a councillor of the Court of Appeal presides, and the president of the local Tribunal of First Instance and an official are members. In all cases the court is assisted by assessors. These courts have full criminal jurisdiction.

Tribunals of First Instance. The Tribunals of First Instance sit at Dakar, St. Louis, Conakry, Grand Bassam, Cotonou, Bamako, and



N.B. MOSLEM LAW. There are Moslem Courts in the three full communes of Dakar, St. Louis, and Rufisque. From them there is no appeal.

FIG. 65. *Native Law*

Kaolack. These courts are composed of a President, a judge, and a legal official (*Procureur de la République*). Their civil jurisdiction is unlimited, but in cases where more than 3,000 francs are involved, there is an appeal. They have also minor criminal jurisdiction.

Magistrates' Courts. Six Magistrates' Courts with extended jurisdiction sit respectively at Ziguinchor, Kayes, Bobo Dioulasso, Niamey, Mopti, and Gao. They have the same jurisdiction as Tribunals of First Instance, but each is staffed by a single officer. When possible, he is a member of the trained magistrature; otherwise he is a member of the administrative service. These courts, indeed, owe their origin and continued life to the paucity of trained magistrates. For years this situation has officially been regarded with dissatisfaction, but the number of these courts has continued to grow. On the other hand, in 1936 they tried only 252 civil and 189 criminal cases as against the 2,888 civil and 2,216 criminal cases tried by Tribunals of First Instance.

Lawyers may practise in all these courts, but nowhere in the Federation are they actively encouraged to do so.

Togo. In Togo there is one Court of Assize and one Tribunal of First Instance. Both these sit at Lome.

Moslem Courts

Moslem Courts are of long standing in French West Africa, but they were entirely reorganized by a decree of 20 November 1932. They are presided over by kadis, and they have jurisdiction in questions of personal status, marriage, successions, gifts, and wills. This jurisdiction extends, however, only over citizens of the three full communes; and, even in these, suitors can, if they prefer, have their cases tried by a French Court with a Moslem assessor. In 1936 Moslem Courts dealt with 1,095 cases. They function, therefore, only in Senegal; and, although legal authority exists to create them in other colonies, Moslems elsewhere are at present subject to native law.

Courts administering Native Law (Fig. 65)

The native tribunal (*tribunal indigène*) of French West Africa is in no sense the court of a tribal chief, but is presided over by a French official. The last vestige of the chiefs' judicial powers was swept away in 1912, and the present system rests on decrees of 3 December 1931 for French West Africa, and of 21 April 1933 for Togo. In civil matters native law is exclusively enforced. Where the customs

of different tribes vary in questions of marriage or divorce the custom of the woman is applied, in questions of contract that of the locality, and in other matters that of the defendant. Before a civil case comes into court, the village chief must attempt conciliation; if this is successful, the agreement can be entered in the court records and enforced as a judgement.

Tribunals of the First Degree. Tribunals of the First Degree usually sit at the headquarters of provinces or of districts and in each full commune. The president of each court is normally the administrative officer for the area concerned, but in civil matters his place may be taken by a native notable. There are two native assessors, chosen from a list, approved by the Governor, of local notables likely to know the customs of the country. The civil jurisdiction extends to matters in which a value of not more than 500 francs is involved, in which case the decision is final. It also has a more limited jurisdiction over matters involving sums up to 3,000 francs, in matters in which no pecuniary value can be fixed, and in questions of personal status, marriage, divorce, and affiliation. In these cases, however, its decisions are subject to appeal, of their right to which the parties must be expressly informed.

On the criminal side the tribunal has jurisdiction over all offences not specially reserved to the Criminal Tribunal. Its powers of punishment extend to a fine of 2,000 francs, banishment or imprisonment for ten years, or both. Confiscation of goods may also be decreed, and the condemned may be debarred from public employment. Before proceeding to sentence the president must inquire what penalty would be inflicted by the native law of the locality for the offence, and must be guided by the reply. From all criminal cases decided by a Tribunal of the First Degree an appeal lies to the Colonial Court of Appeal. In all cases, both civil and criminal, the president must inform the parties of their right of appeal, but its exercise is discouraged by the provision that an unsuccessful appellant may be mulcted of 100 francs in addition to all other expenses.

Tribunals of the Second Degree. Each Tribunal of the Second Degree is composed of a provincial commissioner as president, and two native assessors. It normally sits at the headquarters of its province, but may sit elsewhere, in which latter case the president appoints two local notables as assessors *ad hoc*. In civil matters it acts as a Court of Appeal from the Tribunal of the First Degree, and has unlimited original jurisdiction. It has no criminal jurisdiction. Each full commune has also a Tribunal of the Second Degree.

The assessors in each of the above tribunals have what is called a *voix deliberative*: i.e. they are not merely advisory. At least one of them must concur in the decision of the court.

Criminal Tribunals. The Criminal Tribunal for each province or full commune has the same composition as a Tribunal of the Second Degree with the addition of two European assessors. In provinces where the Governor considers it impracticable to form such a court, one assessor of each race will suffice. At least half of the assessors must concur in the court's decision. Its jurisdiction covers murder and all other serious crimes, and its powers of punishment are extensive. They include the imposition of fines up to 4,000 francs, in substitution for or in addition to any other penalty, banishment for a period up to 20 years, imprisonment for life, and the death penalty; this last, however, requires to be approved by the President of the Republic. In addition the court can decree confiscation of goods, and disqualify the accused from future public employment. This disqualification is automatic in the case of ten serious crimes set out in the relevant decree.

Lawyers may not practise before the native tribunals, but, on a serious criminal charge, it is the duty of the president of the court to assign an official who will assist the defendant in his defence as 'prisoner's friend'.

Colonial Courts of Appeal. A Colonial Court of Appeal sits in the capital of each colony, at Dakar for the District of Dakar, and at Lome for Togo. Each consists of the president of the Tribunal of First Instance or of the Magistrate's Court as president, two senior officials and two native notables nominated by the Governor. On its civil side it hears appeals from Tribunals of the Second Degree and on its criminal side from Tribunals of the First Degree, whether brought before it by the parties or by the Attorney-General. It has no jurisdiction over Criminal Tribunals. Ordinarily it proceeds upon the written records of the lower court, though parties may be ordered or apply to be heard before it personally.

The Supreme Native Court of Appeal. This court (*Chambre d'Annulation*) sits at Dakar, and has jurisdiction throughout the Federation and in Togo. It is composed of the Vice-President of the Court of Appeal, who presides, two professional councillors designated by the President of the Court of Appeal, two senior colonial servants and two French-speaking native assessors designated by the Governor-General. On the civil side this chamber takes cognizance of judgments of the Tribunals of the First Degree which are not normally

appealable, judgements of Tribunals of the First and of the Second Degree where the normal period for appeal has expired, and judgements of the Colonial Courts of Appeal. On its criminal side it takes cognizance of appeals from Tribunals of the First Degree that are normally out of time for appeal to the Colonial Court of Appeal, and of judgements of the Criminal Tribunals and the Colonial Courts of Appeal. Its decisions are given on the written records of the lower courts, and the parties do not appear before it. Criminal cases are put before it by or on behalf of the Attorney-General.

Monthly returns of all judgements of Tribunals of the First and Second Degree and of Criminal Tribunals are sent to the Governor and to the Attorney-General of each colony.

ADMINISTRATIVE SERVICES

Land Tenure

Native Systems

Native customs and traditions concerning land tenure have already been mentioned in Chapter V. The general position with regard to ownership has been well summarized by M. Delafosse.

'One of the most outstanding principles,' he says, 'is that there is not an inch of land without a master, not an inch over which a proprietor and, the greater part of the time, an occupier does not make his rights prevail. Upon this point peoples of the north and south, both sedentary and nomadic, are all in agreement, and this is undoubtedly why the Moslems themselves are little inclined to adopt the rule of Maleki law, which admits, up to a certain point, that vacant land can be without a master. Moreover, all natives are unanimous in admitting that, if the chief of the political unit is the proprietor of the native soil, it is only as the administrator of the territory and the legal representative of the group, to which in the last analysis all the rights to the soil belong. Thus, among the Moslems as well as among the animists, the chief can cede no lands on his own authority except those which he exploits himself and which constitute in a sense his private property. From the native point of view, therefore, it is illegal on the part of the French authority to consider any lands, however small, as domain of the French state, and to grant concessions either to companies or to individuals.'

In the early days of their occupation the French entered into many treaties guaranteeing to the natives their rights in the land. In other parts they based their possession on right of conquest. As the hold of France on the country grew firmer French ideas of land tenure, which abhor such an indeterminate conception as collective ownership, gradually came to prevail. Thus, in the Ivory Coast and Dahomey

decrees of 1900 provided that *terres vacantes et sans maître* (of which, according to native conceptions, there are none) belonged to the State, and that natives could not alienate their lands to outsiders without the consent of the Government. It is just to say that this last provision operates at least as much to the benefit of backward natives as to the Government, and has been adopted in the Northern Territories of the Gold Coast as recently as 1931. The French Guinea decree of 1901 states that 'in the protectorate, which has been placed freely under the sovereignty of France, all land belongs to the chiefs as representatives of the native group', but adds a similar restriction on alienation. The Federal Government consolidated the land laws of the various colonies in 1904, and the legislation at present in force is the decree of 15 November 1935. This roundly declared that ownerless lands throughout West Africa belonged to the State. The same applies to lands which have been unused and unoccupied for more than ten years, unless they are held under a registered title. Lands over which the native tribes enjoy a collective right of use (the term 'property' is studiously avoided in this connexion) can only be alienated with Government consent.

Concessions

The same decree regulates the granting of concessions. Building plots can be granted by the Governors to natives in urban areas in accordance with previously prepared plans. The tenants are compelled to build houses of approved materials and design, and may not dispose of their holdings to any person other than a native for thirty years. Agricultural concessions (*concessions rurales*) of not more than 500 acres (200 hectares) are granted by a Governor in Council; from 500 to 5,000 acres by the Governor-General in Council on the advice of a Governor: over that area by presidential decree on the submission of the Governor-General and with the advice of the Colonial Concessions Commission in Paris. Every concession must have regard to existing native rights, whether of habitation or of cultivation, and, where necessary, provision must be made for their preservation by setting aside native reserves within the area conceded. Such rights can only be extinguished by consent of the administrator of the district after an inquiry, at which, if extinction is permitted at all, compensation will be assured. All applicants for concessions must show that they have, or can obtain, the capital needed to develop their holdings. This rule does not apply to concessions of less than 500 acres, which it is thought can be developed

by individual or family effort; but only one of them may be granted to the same individual.

Until the concession has reached a certain state of development, it is held upon a provisional title (*concession provisoire*), which gives a right of occupation but not of ownership. On a further stage of development being reached, the land becomes the property of the concession holder (*concession définitive*). Formerly the practice was to give a freehold, but since 1937 a long lease with conditions as to working has been substituted. This enables the Government to re-enter without difficulty should the concession be no longer worked; but, subject to its being worked, the holder can obtain renewals indefinitely. At the end of 1937 provisional concessions had been granted covering some 300 square miles and definite concessions covering a further 260 square miles: of these 196 and 165 square miles respectively were in the Ivory Coast. This gives an interesting comparison with French Equatorial Africa, where 327,000 square miles had been granted to European companies before 1900.

On the whole, native rights in land have been treated very sympathetically. European colonization was attempted in the early part of last century, but it was a failure; and since then there has been a general recognition that the surest road to progress lies through native agriculture. The more advanced political conditions of Senegal, in contrast to those of French Equatorial Africa, may have led to better treatment. Public money was available to a larger extent, and progress was steady, even if somewhat slow. Even now, as the figures given above show, it is only in the Ivory Coast that European enterprise is a large factor in development: it is followed at a long interval by French Guinea and French Sudan. Most concessions are held by Europeans with capital, but there is nothing in law to prevent natives holding on the same terms.

Land required for public purposes may be acquired by the Governor of a colony if it does not exceed 250 acres (100 hectares). Larger areas require the order of the Governor-General.

Registration of Title

Immatriculation. A system known as *Immatriculation*, similar to the Torrens system, was first introduced in the colonies of Senegal, the Ivory Coast, French Guinea, and Dahomey in the years 1900 and 1901, and was consolidated by decrees of 24 July 1906 and of 26 July 1932. *Immatriculation* involves the official investigation

of title, the public posting of warning that the property is in question, the survey and permanent marking of the property, and the making of a final record and plan, copies of which go to the purchaser. Once granted, the title so given is unassailable and, if any subsequent claim proves just, the State has to bear the cost of compensation. Immatriculated land comes under French law for all purposes of dealings *inter vivos*, though, if previously subject to native law, it remains so for purposes of succession. Immatrication is only compulsory to perfect a title to a concession, or on a purchase by a European of land hitherto held under native law. It is, however, rather expensive for the average native, and up to 1915 only 1,267 titles had been issued in French West Africa, most of them for urban property. By 1937 this number had grown to 18,525, covering 660 square miles.

Confirmation of Native Land Rights. Immatrication can only be granted to persons or corporations holding on individual titles. Theoretically it was always available to the native holding on an individual title, provided he was willing to undergo the expense and accept the conditions, but it did not provide for the tribe. A simpler form for natives was introduced by a decree of 8 October 1925. This form was experimental at first, but it was rendered permanent by a decree of 20 December 1933. It is known as the Confirmation of Native Land Rights (*Constatation des Droits Fonciers des Indigènes*), and it applies alike to individual and to collective rights. On a tribe applying for its rights to be confirmed, the provincial commissioner makes inquiry of local chiefs and notables. Should there be opposition the question is settled, free of charge, by the native tribunals. If successful, the chief of the applicant tribe receives a certificate of title (*livret foncier*), specifying the nature of his rights. This title does not afford the full protection of immatrication and it does not defeat any claims arising from a prior immatrication; but it does prevent its holder from being dispossessed otherwise than by judicial process, and it forms the root of a written title which time will strengthen. It also has the advantage of leaving the land subject to native law. The procedure has been adopted most widely in the Ivory Coast, where there are many native plantations of permanent crops. Up to 1937, 1,760 titles had been given under this procedure, covering in all 100 square miles: of these, 1,511 were situated in the Ivory Coast, where they covered 84 square miles.

Native land tenure in Togo is similar in its essentials to that of

French West Africa. Much land, however, is still held under German law.

Labour

Forced Labour

The idea of unpaid compulsory labour for the public benefit is found in many parts of the world. In France itself the old *corvée* system has been replaced by the milder one of *prestation*. The latter has been regulated in French West Africa since 1918. The maximum number of days on which a man may be employed is fifteen *per annum*, and these days may not occur during seed-time or harvest. Labour may be used for the construction and maintenance of roads, bridges, telegraph lines, buildings, and airfields, or for any other type of public work. All able-bodied males between the ages of 18 and 50 are liable to compulsory labour, but any man may redeem his liability to work by a daily payment (*rachat*) of from 1·25 to 5·00 francs. In 1935 there were 3,318,000 on the lists, 21,187,000 man-days were worked, and 4,368,400 francs were paid as redemption money. In Togo the number of days is not published, but in 1936 no less than 2,285,000 francs were paid as redemption money. In the following year the amount payable *per caput* was slightly increased, and the total paid dropped to 231,000 francs.

An annual programme of public works is drawn up for each province, and the Council of Notables, where one exists, must be consulted. List of names of men are compiled by the village chiefs.

It has been noted above that military conscripts of the second category may be put to public employment. In 1934, for example, 3,600 men were used in this way, each man being housed, fed, and given 75 centimes a day.

The whole system of forced labour has been severely criticized. Its opponents say that the chiefs abuse their powers of making lists, that there is inadequate supervision, and that free labour would produce better results. Some have advocated the transformation of the redemption payments into a universal labour tax, the proceeds of which would pay for the hiring of men in the normal manner.

Private Employment

The recruitment of labour by commercial firms or by private individuals is carefully regulated. In each colony a Labour Office has been set up to collect statistics and to assist employment, and a Council of Arbitration to settle disputes. There is no special labour

inspectorate, such duties falling on the administrative and medical staffs.

Contracts. All contracts of employment must be entered into before an official, and a copy of the contract must be filed by him. The labourer must be medically examined. The contract deals with hours of work, rates of pay, a weekly day of rest, overtime, advanced and deferred pay, and sick leave, although the precise terms vary with each colony. Workmen must be housed and fed in accordance with government standards, and medical treatment must be provided. The employer is usually liable for accidents occurring during the course of employment. No contract is valid for longer than two years, and part of a labourer's pay may be deferred and paid through the Labour Office on his return home at the end of his period of work. Woman and child labour is regulated under a decree of 18 September 1936, and strikes and collective bargaining, by decrees of 1937.

Similar regulations exist in Togo.

Official returns for French West Africa show that in 1936 there were 26,300 labourers engaged by Europeans under written contract and 102,400 without it; but it is difficult to believe that the latter figure is complete. No figures are available for Togo.

Agriculture and Forestry

Agriculture

One section of the Department of Economic Services is the Inspectorate of Agriculture, Stock-Breeding, and Forests. Its functions are advisory rather than executive, and include the supervision of the colonial agricultural services and the organization of the study of agriculture in all its branches. Each colony maintains its own staff under a Director of Agriculture. Colonies are usually divided into districts (*circonscriptions*), each under an agricultural officer, who inspects farms, advises farmers, wages war on pests, and is in charge of a research or experimental station. He is subordinate to his provincial commissioner.

The composition of the Chambers of Agriculture has been given above.

Forestry

The Forestry Service. The Forestry Service was created by a decree of 18 July 1923. Officers are recruited from the French Forestry Service or from other candidates who have passed through

the National School of Forests and Waters at Nancy. Junior officers (*contrôleurs*) are trained for two years at an agricultural college and then in France at the Forestry School at Barre. The service is not yet very extensive and it hardly operates outside the Ivory Coast. In 1937 there were forty-eight forestry officers, besides contrôleurs and native forest guards.

Classification of Forests. By decrees of 4 July 1935 for French West Africa and of 5 February 1938 for Togo, forests other than those in private ownership are divided into two classes, Reserved (*classé*) and Protected (*protégée*). Forests are reserved by the Governor-General on the report of a board composed of the provincial commissioner, a forestry officer, and the chief of each village of the district concerned. This board determines the area to be reserved and considers native rights, such as those of wood cutting, pasturage, and the collection of produce. Such claims, whether individual or communal, are settled amicably, when possible, between their makers and the board; but in default of agreement, the claimants have the right of appeal to the courts. As long as a forest is reserved, no rights other than those admitted can be exercised within its boundaries, and it cannot be exploited except by the State. If private working is subsequently thought to be desirable, the reservation can be cancelled. The object of reserving a forest is to prevent deforestation; and the process is chiefly applied to forests on steep slopes, on sand-dunes near the coast, and in those northern areas where the Sahara is encroaching. Forests are protected to preserve their utility. Such forests are open to exploitation, however, and the customary native rights need not be individually claimed. The Government commonly sells a considerable quantity of cut wood each year. The total area of reserved forests is approximately 5,400 square miles.

Exploitation. There are two types of forest licences, the Felling Licence (*permis de coupe*) and the Licence for Temporary Exploitation (*permis temporaire d'exploitation*). The first gives permission to cut a named quantity of timber: the latter to work a definite area for a definite period, subject to the rights of the native inhabitants. They are granted by governors of colonies for areas up to 2,500 hectares (6,178 acres), by the Governor-General for areas from 2,500 to 10,000 hectares, and by the President of the Republic for areas larger than 10,000 hectares (38½ square miles). In Togo the Commissioner of the Republic has power to grant licences for areas up to 10,000 hectares.

Private owners are compelled to manage their estates in accordance

with the advice of the Forestry Service. This includes compulsory replanting where unlicensed felling has taken place. The Government encourages reafforestation by money bonuses and by the free distribution of seeds and young plants.

Native Provident Societies

History. These societies, so striking a feature of French colonies, were not official bodies in origin. The first of them was started in 1909. In that year the farmers and stock-breeders of Baol in Senegal were much disturbed by the gradual lowering of the local water-table. They formed themselves into a society, under the presidency of their provincial commissioner, to buy the material and to hire the labour necessary to dig wells. Within a few months they had collected more than 100,000 francs. A few months later the native farmers of Sine-Saloum were very short of seed; they were persuaded to combine to purchase some and afterwards to reserve more seed for the future. After the harvest of 1909 over 270 tons of seed were put aside for the common benefit. The news of such activities spread rapidly, and other associations were formed. A decree of 29 June 1910 gave them legal status under the name of Native Provident Societies (*Sociétés indigènes de prévoyance, de prêts, et de secours mutuels agricoles*).

Objects and Rules. To-day these societies are regulated under the decree of 9 November 1933. Their objects are declared to be the development of agriculture, stock-breeding, and fishing and the improvement of the harvesting, preparation, storage, and sale of produce. They can construct and own buildings and stores, arrange communal marketing, keep breeding stock, and assist needy members by making loans in cash or in kind. Such loans are also made to enable members to maintain, develop, and improve their own farms, implements, or livestock. The societies can fix prices with other societies or authorized organizations, on condition that these prices only apply to their own members.

Membership of a society is limited to persons subject to native law. Only one society may be formed in each province, and, if a society exists, membership is compulsory upon all native cultivators in that province. The Governor's consent is required in each case.

Each society is administered by a committee of at least six members under the presidency of the provincial commissioner and with a secretary-treasurer appointed by him. In each colony there is a

Central Supervisory Committee, composed of the Secretary-General, an inspector of administrative affairs, the heads of the agricultural service, and three native chiefs. In practice, therefore, there is complete official control.

An annual budget, for which the provincial commissioner is responsible, is passed by each society at its general meeting. Funds consist of members' subscriptions, profits on working, direct grants from the Government, and advances from the Bank of Agricultural Credit. Ten per cent. of any profits must be invested in Government securities as a reserve fund. The rest may be carried forward or distributed to members. The annual subscription is usually in the neighbourhood of 1 franc.

On 31 December 1937 there were 102 provident societies in French West Africa with a total membership of some 8,500,000. In round figures their receipts amounted to 35,000,000 francs, to which members' subscriptions contributed just under 10,000,000 francs. Expenditure included 14,000,000 francs on seeds and implements, 2,000,000 francs on the purchase of property, and 19,000,000 francs on advances to members and on other expenses. Their total land holdings were valued at 39,000,000 francs and their investments in State securities at 2,500,000 francs.

Agricultural Credit

The Bank of Agricultural Credit (*Caisse Centrale de Crédit Agricole*), mentioned above, has branches in each colony. It was set up by decrees of 23 May 1926 and of 26 June 1931. It can grant loans, not only to native provident societies, but also to European societies and to individual planters. The rate of interest was originally limited to not more than 1 per cent. higher than the current rate of the Bank of West Africa; but in 1931 an order of the Governor-General laid it down that long-term loans to individuals could carry interest at 4 per cent. The total of all loans made from 1932 to 1936 was 45,000,000 francs. Each branch is governed by a board composed of nominated and of elected members.

A similar system of provident societies and of agricultural credit exists in Togo.

Mining

Each colony has its own Mines Department, but the general supervision of mining is the care of the Mines section of the Inspectorate-General of Public Works. The Geological Survey also comes under this head. Legislation about minerals now rests on a decree of

3 December 1934, and by its provisions the products of the subsoil are divided into two classes: building materials and minerals proper. The former are the property of the owners of the surface and do not concern the Mines Department.

Prospecting Licences

The first step in the prospecting for minerals is the obtaining from the Governor-General of a personal licence (*autorisation personnelle*). This is granted to individuals or to companies, French or foreign, on production of evidence of good faith and of financial stability. It may be refused without any reason being given. The next step is to obtain a licence under one of two systems, the Occupation System (*Système de l'Occupation*) or the Royalty System (*Système du Droit Régalien*). The former is by far the commoner.

The Occupation System. There are four successive stages in this system, each marked by the issue of a different type of licence. (1) A general prospecting licence (*permis d'exploration*) costs 30,000 francs and is valid for three years. It cannot be renewed. The holder has the right of prospecting over an area not exceeding 10,000 square kilometres (3,861 square miles). It was intended that the issue of these licences should be confined to reserved areas, but no such areas have as yet been defined. (2) An exclusive licence (*permis de recherche*) gives the right to search and to develop a defined area of 25 square kilometres (9½ square miles). It is granted to the holder of a general prospecting licence, who can obtain one exclusive licence for each 50,000 francs that he has spent in prospecting. It is valid for two years and can be renewed twice, conditional upon regular development of the area concerned. For a second renewal the holder must show that he has spent at least 20,000 francs. (3) A mining licence (*permis d'exploitation*) is granted to the holder of either of the foregoing if he can prove the existence of a satisfactory mineral deposit. It is valid for four years, and may be renewed for four further periods of four years, a total of twenty years in all. (4) A concession (*concession minière*) is granted by the Governor-General with the same formalities, including reservation of the rights of the natives, as for an agricultural concession. The land must be immatriculated. A concession is valid for seventy-five years and renewable indefinitely for periods of twenty-five years at a time. For the first six years the holder pays 50 centimes per hectare (2½ acres) of land and thereafter 5 francs. It can be cancelled if the holder fails to develop his minerals.

The Royalty System. Under this system the State takes a percentage of the profits. It can be used for precious metals, precious stones, phosphates, nitrates, alkaline salts, iron, manganese, and bauxite throughout French West Africa, and for certain other minerals in some of the colonies. It has three stages: (1) A general licence (*permis général*) corresponds to the general prospecting licence of the other system. It is granted by ministerial decree, which defines the area in which it is to be exercised, the terms, and the duration. This last is usually three years with the possibility of renewal for two more years. (2) One exclusive licence, or (3) one mining licence may be granted to the holder of a general licence for every 30,000 francs that he has spent. These confer similar rights to those given under the other system, but the holders pay royalties instead of fixed dues.

Mineral Oils. Power exists to close any area to prospecting by individuals or by companies, but it has not been exercised up to the present. A special form of general prospecting licence, limited to oils, is required. This covers an area of 100 square kilometres (38½ square miles) and is valid for three years. It is renewable for an additional four years on proof of work having been done. For oil-mining there are no exclusive or mining licences, but the holder of a general prospecting licence can, during its currency, take up within his area one concession not exceeding 25 square kilometres (9½ square miles) in extent. The duration of this type of concession is forty years.

Native Reservations. A feature of the mining legislation of French West Africa, unique in the French Colonial Empire, is the reservation of certain areas to native miners. These areas are in French Guinea and the Ivory Coast, and they are subject to special regulations.

Numbers of Licences. The following licences were in force on 31 December 1937:

Personal licences	53
<i>The Occupation System:</i>	
Exclusive licences	250
Mining licences	139
Concessions	25
	414
<i>The Royalty System:</i>	
General licences	4
	4
Total	471

Togo

Mining legislation in Togo is similar to that for French West Africa.

Public Works

Attached to the Ministry of the Colonies there is a Committee of Colonial Public Works, whose function is advisory both generally and on particular projects. There is also an Inspectorate-General of Colonial Public Works. French West Africa has its own Inspectorate-General of Public Works, and each colony has a staff under a departmental head (*chef de service*).

The Public Works Department is responsible for ports (where not otherwise provided for), main roads, inland waterways, irrigation, and for supplies of water and electricity. It also manages any transport services maintained by the Government, has a general supervision of railways, and, as stated above, has the oversight of mines.

Togo. During the economic depression of the thirties the Public Works Department of Togo was merged in that of Dahomey, but an order of 23 February 1938 reconstituted it as a separate organization.

The Office of the Niger

Details of the plan for the irrigation of the inland delta of the Niger will be found in Chapter X. The cost of the main scheme, which was approved in 1931, was estimated at 300,000,000 francs (£2,000,000), and secondary works will probably cost an equal sum.

In 1932 a special organization, the Office of the Niger, whose first director-general was M. Bélime, was formed to deal not only with the scheme outlined above, but with general developments of the Niger basin as a whole, including mining surveys and agricultural development. This office is under the authority of the Governor-General, and on its board are representatives of official and unofficial interests, both French and colonial. This board meets annually in Paris, but the director-general, with a local advisory board, has his office at Ségou. Its laboratories at that place undertake investigations into crops and soils, and its experts give instruction to applicants for lands.

*Education**General Organization*

Attached to the Ministry of Colonies there is a Supreme Advisory Committee on Education consisting of forty-two members. In French West Africa a Supreme Council of Education meets annually

at Dakar to discuss educational problems and to advise the Governor-General. The Inspector-General of Education is responsible for the main lines of policy and for the apportionment of staff among the various colonies. Higher education and technical schools are also under his direct control, and inspectors of schools make their reports to him. Otherwise education is in the hands of the colonial governors.

French educational activity was a matter for the individual colonies until 1903, and was at first limited to the making of grants to mission schools. In 1857 Faidherbe founded the first secular school (*Lycée Faidherbe*) at St. Louis, and in the eighties Galliéni opened similar schools in some of the towns of French Sudan. Even so, by 1900 there were only 70 schools and 2,500 scholars throughout French West Africa, and education in the Ivory Coast and in French Guinea was still entirely in the hands of missionaries. The foundations of the present system were laid by an order of 24 November 1903, which was modified in 1918 and in 1924.

To-day there are two distinct types of education, the European and the African. In both, the French language is the sole medium of instruction.

European Education

This is arranged in strict parallel to the French system. Precisely the same teaching is given as in the corresponding schools in France; so that a child, for example, leaving Dakar for Marseilles can resume his studies in his new school at the point at which they stopped in his old one. There are three grades of school: infant, primary, and secondary. All the colonial capitals have infant schools, but primary schools and secondary schools (*lycées*) are found only at Dakar and at St. Louis. Many of these schools take boarders.

Though these establishments are called European schools, and are mainly attended by European children, there is no colour bar. African pupils may take the European course, and occasionally, in remote stations, European pupils take the African course. The true difference lies in the aims of the two courses. The former fits children to take full part in French life, the latter in African. At the same time, the native pupil is given as much of French culture as he can absorb.

African Education

Primary Schools. There are four classes of primary school: Village, Regional, Urban, and Higher.

According to the strict letter of the law a Village School must be opened in any place where there are 30 or more children under the age of 11. This is by no means always the case, and in 1937 there were only 310 such schools throughout the whole Federation, many of them badly understaffed. They had on their rolls 23,570 boys and 2,625 girls, a total of 26,195 pupils, whose ages ranged from 6 to 13. These schools are usually under African headmasters. For their first two years children do little but learn to speak, read, and write French. Other elementary subjects are added later, and attention is paid to local agriculture and industries. School farms are not uncommon.

As its name implies, a Regional School serves a large area, many of its pupils coming from a distance and being provided with free board and lodging. The curriculum is more advanced than that of a village school, and it includes the history and geography of France and of French colonies, elementary hygiene, and more advanced technical subjects. Where local circumstances permit, a class of apprentices is formed to work in the public or private workshops of the district. A regional school is supposed to be under a European headmaster, but this is not always possible. In 1937 there were 96 regional schools with 19,434 boys and 2,562 girls, a total of 21,996 pupils. The Urban School is the town counterpart of the regional school, but with a more literary bias to its curriculum and approximating more closely to a provincial primary school in France. In 1937 there were 26 such schools with 6,675 boys and 1,269 girls, a total of 7,944 pupils.

For more advanced education there are Higher Primary Schools. Most of these schools have two sides, an academic side for pupils who aim at clerical employment or the learned professions, and a technical side, which trains for the postal, survey, public works, or railway services, or for private employment of a similar kind. Entrance to them is by examination at the age of 14 or 15, and the annual intake is based on the Governor's estimate of the opportunities of employment for the pupils at the end of their four years' course. In 1937 there were 8 schools of this type with 644 boys and 73 girls, a total of 717 pupils. The technical sections are tending to split off from the academic and are sometimes known as *écoles professionnelles*.

Secondary Schools and Training Colleges. The Lycée William Ponty at Dakar gives a good secondary education and training for teachers in urban schools. This school is an amalgamation of the Lycée Faidherbe (transferred from St. Louis) and the original Lycée William Ponty,

which was founded in 1903 as a teachers' college. The full course takes four years, and finishes when the student is 22 or 23. There are two training establishments for teachers in rural schools, one at Katibougou near Bamako and the other at Dabou in the Ivory Coast.

The Medical School at Dakar is run in association with the Central Native Hospital. It gives a five years' course on very modern lines to some sixty students. This, however, does not entitle the men to practise in France. The school also trains dispensers and nurses. There is a Veterinary School at Bamako, a School of Navigation, and a School of Marine Engineering. Both the latter are at Dakar, their courses last four years, and pupils, if required to do so, must serve in the Navy before taking up civil employment.

There are also short technical courses for adults, mainly in agriculture and hygiene. In 1937 there were 230 of these, attended by 9,285 persons.

Schools for Chiefs. In the Moslem areas of French West Africa there are four special schools for sons of chiefs. The oldest of these was founded by Faidherbe in 1855 at St. Louis and has served as a model for the subsequent institutions at Timbuktu and Timebédra in French Sudan, at Boutilimit in Mauritania, and at Diourbel in Senegal. In addition to a general education the four years' course of study at these special Moslem schools (*medersas*) embraces Koranic philosophy and religion, and the theory and practice of French administration. The object of these schools is to Gallicize the future leaders of Moslem thought, and they have some 300 pupils.

Private Schools

The position of private schools is regulated by a decree of 14 February 1922. No school may be opened without authorization; and, if the school wishes to qualify for a government grant, its curriculum must be the same as for state schools, instruction must be given in French, and all European teachers must be fully qualified. In practice, however, these rules are not always strictly obeyed. Almost all the private schools are run by missionaries, the most prominent of whom are members of the Ordre de Notre Dame d'Afrique (White Fathers). In 1937 there were 66 private schools with a total of some 12,000 pupils. Almost one-third of these were girls, the missions paying more attention to female education than did the Government.

Pupils, Staff, and Finance

In 1937 there were 432 state schools in French West Africa contain-

ing some 56,000 pupils. There were 323 European teachers and 1,026 African. The total expenditure on education was 23,200,000 francs, of which 2,600,000 francs came from the federal budget.

Togo

The educational system of Togo is very similar to that of French West Africa. The provisions of the mandate, however, require that freedom of access be granted to the missionaries of all states which are members of the League. For this reason private education is more widely spread. Private teachers do not need French qualifications, and need not use French as the sole medium of instruction, though only those schools in which French is taught are available for a grant.

The following table shows the numbers of schools and pupils in 1938:

	Schools	Boys	Girls	Total
Government . . .	53	4,253	649	4,902
Roman Catholic . . .	35	3,623	917	4,540
Evangelical Mission . . .	15	992	253	1,245
Wesleyan . . .	3	154	16	170

There were thus the same number of mission schools in all as government schools, but more pupils, 5,955 against 4,902. This forms a notable contrast to French West Africa.

Health

Diseases, their prevention, and their cure are treated of in Chapter V, but the following paragraphs give a sketch of the organization of medical services.

Inspectorate-General. The Inspector-General of Medical and Health Services resides at Dakar. His function is to advise the Governor-General on matters affecting health, and to supervise the health services of the individual colonies. Each of these has its own Director of Health Services (*Chef du Service de Santé*), responsible to his Governor.

Staff, Hospitals, and Patients. Most of the doctors in government employ are army officers who have taken a course in tropical medicine. Up to the present there has been considerable difficulty in recruiting civilian medical men, and a certain number of foreigners have been engaged. In 1937 the European staff comprised 180 medical officers, 68 nurses and dispensers, and 30 health visitors. The African staff had 185 auxiliary doctors (i.e. medical assistants trained at Dakar), 250 health visitors, and 1,733 subordinate personnel. There were 11 main

hospitals and 437 subsidiary hospitals, medical stations, medical posts, and dispensaries; there were 788 beds available for European patients and 5,484 for African; in-patients numbered 4,731 Europeans and 42,785 Africans; and out-patients numbered 19,859 Europeans and 3,113,819 Africans. The total expenditure on medical services was 38,000,000 francs.

Apart from the staff employed in the hospitals, laboratories, and other central institutions, the government programme aims at providing each province with at least one medical centre with a European officer in charge, assisted by African auxiliaries. These centres deal with urgent surgical cases, and supervise subsidiary centres (*infirmeries*) in charge of African auxiliaries, who in their turn are responsible for dispensaries in charge of African nurses. The auxiliary medical staff is not allowed to work without European supervision, and therefore, owing to the insufficient European staff, there are fewer of these centres than could be desired. In practice, however, many auxiliaries are working without the desired supervision, and most of them are fully competent to do so. The special organization to combat sleeping-sickness is dealt with in Chapter V. The general medical staff, assisted by the police, is responsible for sanitation.

In addition to the government system, private organizations play some part in health services. Local branches of the Croix-Rouge Française and the Berçeau Africain are mostly concerned with infant welfare, and missions have set up some dispensaries and leprosy hospitals.

Togo. The organization of health services in Togo follows similar lines to those of French West Africa. In 1936 the medical staff comprised 13 Europeans, 6 African auxiliary doctors (trained at Dakar), and 197 other African assistants. There were 2 hospitals, both at Lome, one being for Europeans and the other for natives. There were also 5 medical centres, 21 dispensaries, and 5 maternity centres. Treatment was given to 62 Europeans and 4,255 native in-patients and to 933 European and 544,515 native out-patients. Total government expenditure amounted to 3,863,897 francs.

CHAPTER IX

MINERAL ECONOMICS

(Fig. 66)

THE mining industry of West Africa, which until the last two decades was concerned almost exclusively with the production of gold, is a relatively ancient one. Gold has been worked by the natives of French Guinea for several centuries, and the first recorded exports from the Gold Coast to Europe date from 1471, when the Portuguese landed at Elmina, opened up mines, and established a trade in gold dust. Prior to 1877 the entire gold production was in the hands of Africans, mostly working alluvial deposits: in 1878 the first European mining commenced on the blanket reefs of Tarkwa, and to-day 97 per cent. of the large gold output of the Gold Coast is obtained from gold-bearing conglomerates and quartz lodes by extensive underground operations. In Sierra Leone most of the mining is still alluvial, as it is also in French West Africa, where, in contradistinction to the British colonies, 98 per cent. of the production is in the hands of natives working on their own account.

The relative importance of the mining industry in British and French possessions may be observed from the following table:

	<i>Gold Coast incl. British Togo</i>	<i>Sierra Leone</i>	<i>French W. Africa incl. French Togo</i>
Area, sq. miles . . .	91,843	28,000	1,844,828
Population . . .	3,160,000	1,770,000	15,700,000
Personnel employed in mining (1937) . . .	38,000	14,000	9,000
Mineral production (1937) . . .	£4,260,000	£1,660,000	£768,700 (= 99,900,000 frs.)

The Geological Survey of the Gold Coast, the first permanent survey of its kind in West Africa, was founded in 1913, and it is in large measure due to the work of this institution that the British possessions now occupy their prominent position in the mining world. In addition to detailed investigations furthering exploitation in various goldfields, the Survey has been responsible for the discovery of the extensive manganese, diamond, and bauxite deposits which now play an important part in the economics of the colony. In Sierra Leone, where as late as 1926 there were believed to be no mineral deposits of

noteworthy value, the Geological Survey has discovered vast beds of haematitic iron ore and payable deposits of gold, diamonds, platinum, and chromite, now yielding exports worth about £1·5 millions annually. In French West Africa an official Geological Survey was not appointed until 1931, since when it has been primarily engaged in preparing a geological map of the Federation, much of which yet remains

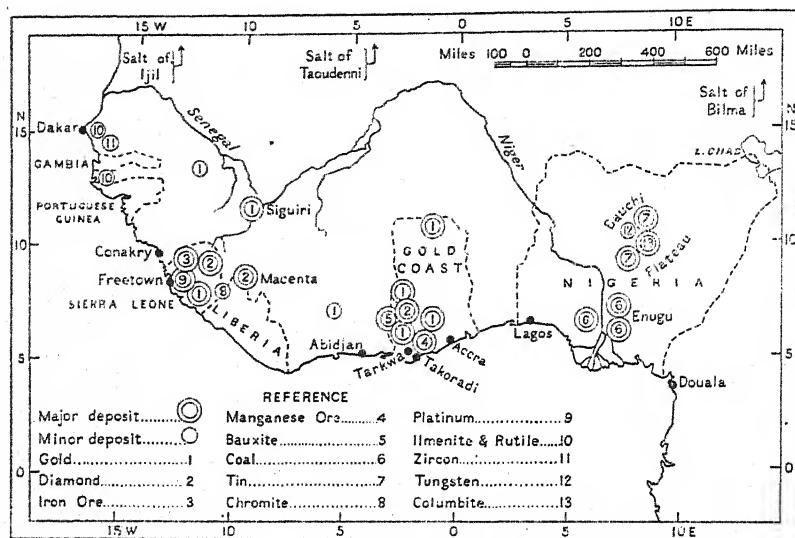


FIG. 66. Mineral Workings

geologically unexplored. Ores of iron, manganese, copper, titanium, and chromium, as well as extensive bauxite, gold, and diamond deposits, have been located, although frequently too far from lines of communication for ready exploitation. In addition, hydrological studies have been made which have proved of notable value to agricultural communities and herdsmen of the sub-desert and Saharan regions.

The following notes summarize the state of development of the mining industry at the outbreak of war, more detailed reference being made, where possible, to the resources of French West Africa.

GOLD

French West Africa

The historic centre of gold-mining in French West Africa is the

Bouré district to the north and north-west of the town of Siguiri, in the north-east of French Guinea. This region, where some 70,000 Africans are employed, is almost entirely reserved for natives working on their own account. Operations are largely confined to the months of January to July, and only about a quarter of the Africans in the field are 'professional' miners who depend solely upon mining for their livelihood; the remainder return to their villages for agricultural work at the end of each mining season. Of the total number of natives engaged in the field, 40,000 are derived from the Siguiri district and the rest come from neighbouring or remote agricultural communities, some as far removed as Faranah in French Guinea and Ségué a hundred miles north of Bamako.

The gold is almost all derived from lateritic placer deposits (partly of alluvial, partly of residual origin) which commonly yield 1 to 3 gm. per cubic metre¹; but the gold content exceptionally reaches 7 gm., and when a placer yielding over 2·5 gm. per cubic metre is discovered, a 'gold-rush' develops. Each year there are four to five 'rushes' grouping 10,000 to 15,000 workers in the one locality. The laterite is worked to bedrock by pits and shallow galleries, the tools of the miner being a small pick (commonly fashioned from part of a motor-car spring), a calabash for panning, and a petrol tin for his water-supply. A small family is said to produce 200 gm. (6·4 oz.) of gold each season.

In addition to these placers the alluvium along small watercourses, formed by the rains of July to November, is occasionally exploited. The alluvium of the larger rivers is also sometimes washed by the women between April and June, and where a gold-bearing quartz-vein is found in the country rock, as happens at times in the Sankarani region, the quartz is pulverized by female labour and washed for the precious metal.

Production by these natives in 1937 amounted to 3,115 kg. (100,148 oz.), which, at a price of 25 francs per gramme, represents 87,500,000 francs. The return to the miner, which must vary according to locality, professional ability, and chance, is stated to average 2,000 francs per man and 830 francs per woman.

Minor gold workings occur elsewhere in French Guinea and Sudan, especially along the Falémé river on the Sudan-Senegal frontier; along the river Perma and in the Oli, Sota, Alibori, and Mekrou basins in north Dahomey; and in the south-east part of the Ivory Coast. All workings are alluvial. The main gold deposits which are, or have been, exploited occur in a region of metamorphic schists, but

¹ 1 gm. per cubic metre = 0.0258 oz. (troy) per cub. yard.

little seems to be known about the source of the gold or how far the bedrock is mineralized. European prospecting, which is only in its initial stages, has hitherto for the most part been confined to areas where the natives have already worked, and it is noteworthy that of 128,410 oz. of gold exported from French West Africa in 1937, 125,631 oz. were of native production.

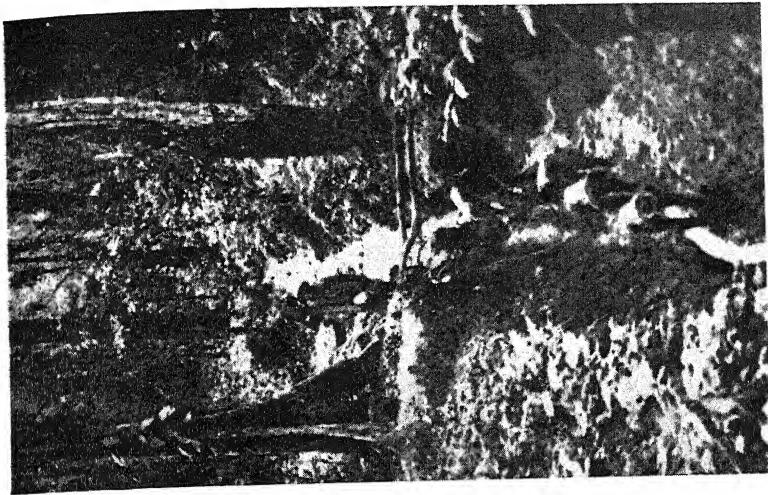
Gold Coast

In the Gold Coast lode and alluvial gold is widely distributed over an area of at least 20,000 square miles, much of which has been little tested save by surface prospecting. In brief, the gold occurs as (1) basket reefs—beds of hardened auriferous conglomerate, of pre-Cambrian age, similar in many respects to the basket conglomerate of the Witwatersrand; (2) quartz reefs, formed along fissures in the country rock and consisting of milky-white or translucent quartz with free gold; (3) detrital deposits, of sedimentary or alluvial origin. The output from these three sources in the fifty years 1888–1938 totals about 10,500,000 ounces.

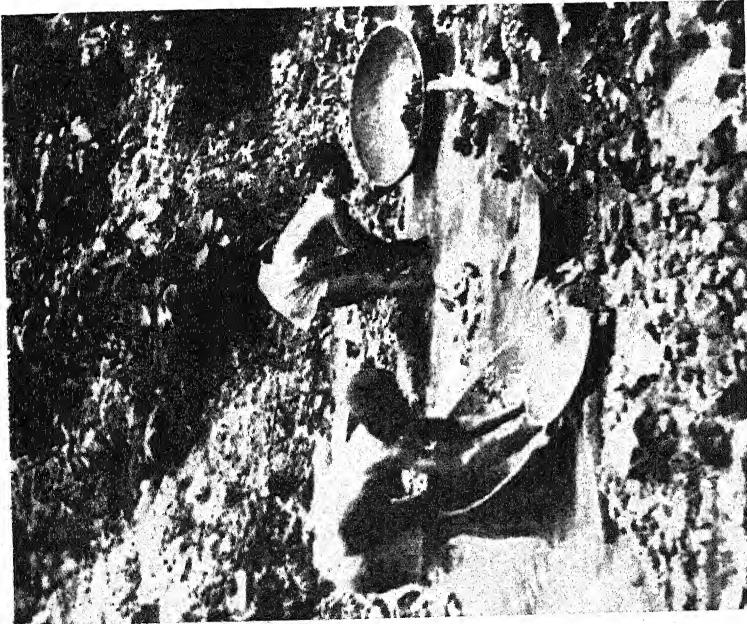
In 1938, 17 companies were mining, and 13 producing, in quartz reefs or basket, while 2 were producing from alluvium. The basket workings are at Tarkwa and Aboso in the Wasaw-Aowin district, Western Province, and at Adowsena, 45 miles north of Oda, in the Western Akim division of Central Province. Reef workings, which include those of the well-known Ashanti Goldfields Corporation, Ltd., are in the Prestea region of the Wasaw-Aowin district; at Bibiani in the Sefwi district, Western Province; at Obuasi and Konongo, Ashanti; at Dokuripe and at Navrongo and Bawku, Northern Territories. Alluvial concessions worked on a large scale by dredging include the bed and alluvial flats of the upper Ankobra river and of the Tano river near Asankrangwa, in the Wasaw-Aowin and Sefwi districts.

The following table gives an analysis of the output for the year 1938–9:

		<i>Nature of deposit</i>	<i>Gold won (fine oz.)</i>
Colony	.	Basket	137,375
		Quartz reef	242,677
		Alluvial	21,177
Ashanti	.	Quartz reef	292,184
Northern Territories	.	Quartz reef	8,003
Total	.	..	701,416
Value	.	..	£2,979,617

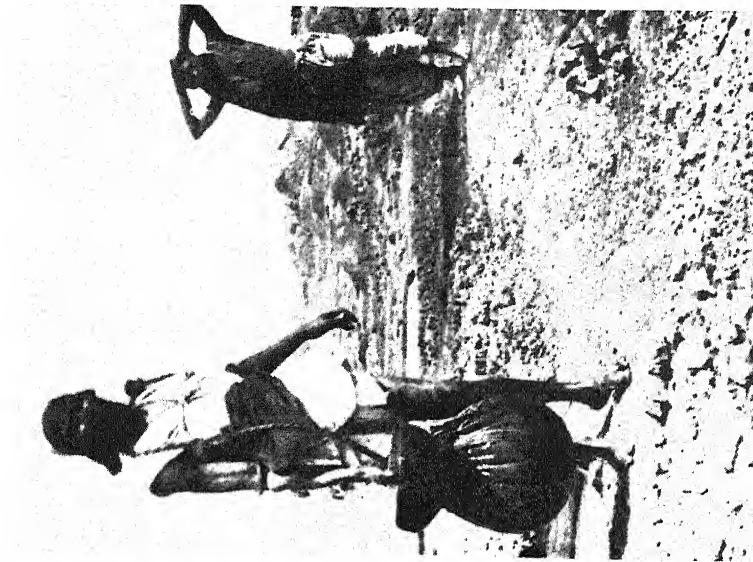


61. Alluvial gold workings

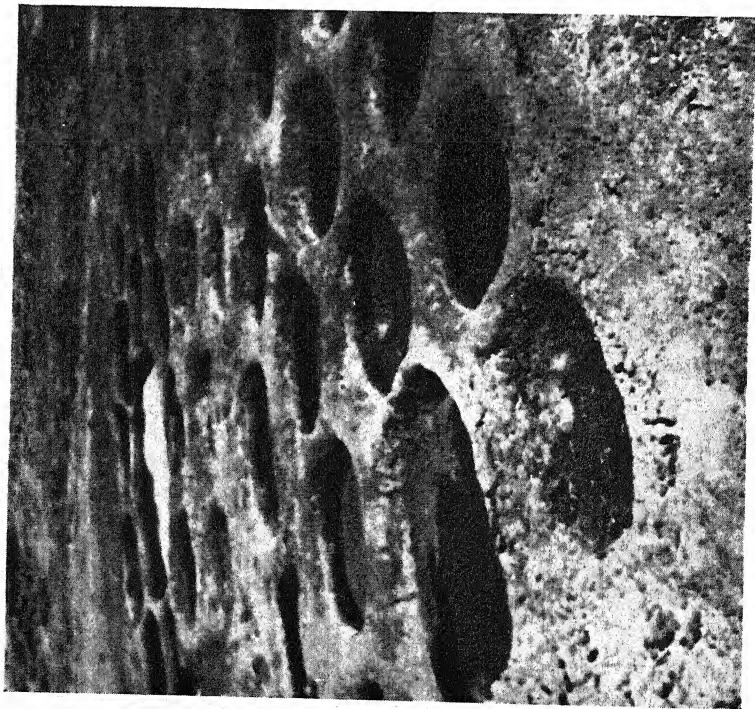


60. Washing for gold

63. Salt workers at Taoudenni



62. Salt mines at Taoudenni



The labour employed in gold-mining and prospecting operations in the year 1938-9 averaged 32,910 Africans and 939 Europeans. Mining operations other than for gold (i.e. for manganese and for diamonds) gave employment to another 6,212 Africans and 87 Europeans. Mining companies expended approximately £2,891,000 on account of all mining operations, including £1,036,000 in wages to African employees—an average of £26. 10s. per man.

Sierra Leone

In Sierra Leone the gold-mining industry in 1937 provided direct employment for an average number of 8,912 Africans, 44 Europeans, and 24 Syrians. 39,151 ounces of crude gold were produced, valued at £251,766. The bulk of the output is of alluvial origin and produced by relatively small syndicates. The direct revenue to the colony from mining operations (including diamond mining) in this year amounted to £226,455.

Liberia

Production of gold in Liberia, principally from alluvial deposits, has advanced from 965 ounces in 1935 to 6,536 ounces in 1939.

DIAMONDS

Gold Coast

The first discovery of diamonds in British West Africa was made in February 1919 by the Gold Coast Geological Survey, near the Birim river in Akim Abomoso. Rapid prospecting which followed proved a large diamantiferous area in the Birim basin. Production commenced in the Gold Coast in 1920, and, by 31 March 1939, 14,139,683 ct.¹ valued at £7,619,186 had been exported. Annual exportation in the pre-war years (1934-9) averaged about 1,450,000 ct. valued at about £600,000. Five mining companies are in operation, and apart from native Africans working on their own account in the Wasaw-Aowin district and elsewhere (who produced 32,811 ct. in 1938), the average daily labour employed in diamond mining in 1938-9 was 5,005 Africans and 43 Europeans.

Sierra Leone

Early in 1930 diamonds were discovered near Jaiama in Sierra Leone, again by the Geological Survey, and another discovery was made near Kennema a year later. In 1932 the Consolidated African

¹ 1 metric carat = 200 milligrammes.

Selection Trust (later the Sierra Leone Selection Trust) commenced operations and proved a number of new fields, this company holding a monopoly for the exploration and exploitation of diamonds in Sierra Leone. Production has rapidly advanced from 748 ct. in 1932 to 913,401 ct., worth £1,084,664, in 1937 and 689,621 ct. in 1938. In 1937 the trust employed 1,600 Africans, half of whom were engaged in production and half in prospecting, police work, building, and road maintenance.

French West Africa

The diamond workings are in the Macenta province of south-east French Guinea, and are exploited by the Société Guinéenne de Recherches et d'Exploitations Minières ('Soguinex'). Production began in 1936, with an output of 5,500 ct., rising in 1938 to 61,929 ct., valued at £3,700, and to about 75,000 ct. in 1940. Approximately 500 persons are employed. A few diamonds have also been recorded from the Ivory Coast.

Liberia

Diamonds were recorded from Liberia as early as 1910, from alluvial flats along the Bar and Joblong rivers. There was a small production in 1937.

West Africa generally

All the West African diamond fields are of alluvial character, the stones being worked from gravels and other alluvium, often lateritic, along river courses. Although there is no doubt that the diamonds are derived from the pre-Cambrian system, the nature of the original parent rock is unknown. Probably it was of ultrabasic character, since the occurrence of diamonds in chromiferous laterite nodules is not uncommon. A characteristic of the stones is their small size: diamonds exceeding 2 carats in weight are rare, and approximately two-thirds of the stones over 1 mm. in size pass a 2-mm. sieve. Two remarkable diamonds, respectively weighing 250 and 530 ct., were discovered in Sierra Leone in 1943. The larger of these is the seventh largest diamond known. Bort and fine sand constitute somewhat over two-thirds of the total production.

Sierra Leone and the Gold Coast outrank South Africa as diamond-producing countries, and are only surpassed by Belgian Congo, which produces 75 per cent. by weight, and 25 per cent. by value, of the world output.

IRON ORE

Sierra Leone

Sierra Leone possesses the largest known reserve of high-grade iron ore in West Africa. There are two main ore-fields: (1) at Tonkolili, in the south-east part of the Koinadugu district, 125 miles up river, where the haematite bodies are of great width and continuity, assaying 52-69 per cent. iron; (2) at Marampa, Lunsar, connected by a 3 ft. 6 in. gauge railway, 55 miles long, to the loading port at Pepel, and containing some 10 to 12 million tons of first-class hard-grade haematite ore assaying 57-58 per cent. iron. In addition there are very large reserves of powdery ore. The Marampa deposits are exploited by the Sierra Leone Development Co., Ltd., who have also prospected the more remote Tonkolili ores. Shipment began in 1933, and in 1938 reached 861,955 tons. In 1937 an average of 2,638 Africans were employed in the Marampa mine and a further 1,483 Africans in transport, loading, and constructional work.

Gold Coast

Very great quantities of ferruginous laterite, in part forming iron ore of fair quality, are met with throughout the Gold Coast as well as elsewhere in West Africa. Large ore deposits, respectively of siliceous and of titaniferous haematite, are known near Shiene and at Pudo in Northern Territories. At present none of these ores is of economic value.

French West Africa

Limonite-rich laterites, containing up to 50 per cent. iron, have been prospected in the neighbourhood of Conakry in French Guinea, where reserves are of the order of thousands of millions of tons. No attempts have been made to develop these low-grade ores, in which the presence of appreciable chromic oxide is considered an obstacle to utilization. Similar deposits are widely developed throughout French Sudan, the Ivory Coast, Dahomey, and Niger. Both limonitic and haematitic ores are smelted in native bloomeries, particularly by the Hausa and the Dendis in the Niger valley, and by the Baribas to the east of Kandi.

MANGANESE

Gold Coast

Exploitation of the manganese ore of the Gold Coast began in 1916, and in 1923 exports passed the 100,000-ton mark. Shipments reached

527,036 tons, valued at £1,166,175, in 1937, falling to 324,207 tons (£681,188) in 1938 and 336,312 tons in 1939, but increasing materially in 1940. Approximately half the exports are shipped to the United States. The Gold Coast is now the fourth most important producer of manganese in the world, after Soviet Russia, India, and the Union of South Africa.

The ore is a surface concentration from the weathering of manganese-rich metamorphic rocks, and is in large proportion of high quality, with upwards of 50 per cent. manganese. The only deposit worked, that of the West African Manganese Co., Ltd., is at Nsuta, near Tarkwa, in the Wasaw-Aowin district. 1,065 Africans and 42 Europeans were employed in 1938-9.

French West Africa

There are numerous occurrences of manganese in French West Africa, especially in French Sudan and the Ivory Coast. For some miles along the bank of the Niger near Ansongo, manganese-impregnated quartzite is known, but the district is remote and the presence of rapids prohibits river transport. Similar quartzites occur near Bondoukou in the Ivory Coast, furnishing a 50 per cent. rich ore in the oxidation zone, and other indications of manganese have been found in the provinces of Kong, Bas Cavally, and to the south-east of Agboville. None of the deposits has been worked.

BAUXITE

Gold Coast and Sierra Leone

Although ferruginous laterite has long been known to be of widespread development throughout West Africa, the occurrence of notable quantities of bauxite (the highly aluminous pale-coloured variety of laterite from which aluminium is manufactured) was unknown until 1914. In the Gold Coast proved reserves of first-class ore (Al_2O_3 60%, Fe_2O_3 9.7%, SiO_2 1.4%) now amount to over 60 million tons in the more accessible deposits alone, suitably situated for transport by the Kumasi-Takoradi and Kumasi-Accra railways. Enormous reserves are probably present in more remote regions, while deposits are also known in Sierra Leone. Up to the outbreak of war there had been no noteworthy export of Gold Coast bauxite, but shipments have since been made and plant is now under construction by which it is proposed, from 1943-4, to ship 500,000 tons from Takoradi each year.

French West Africa

The bauxite of western French Guinea, between Boke and Koumbia, has attracted most attention because of its proximity to the sea. In addition the Bauxites du Midi company has prospected the two largest of the Los islands, and has localized zones in which the laterite is sufficiently rich to be exploitable (Al_2O_3 48–61%, SiO_2 1·5–8%). Vast deposits of high-grade ore (Al_2O_3 54–71%, SiO_2 1·5–4·5%) exist in the region of Tougue, but are 180 miles from the sea and 30 to 120 miles from the nearest railway. The extensive domestic resources of bauxite in southern France undoubtedly explain why these colonial ores have not been developed.

CHROMITE

Sierra Leone

Export of chromite from Sierra Leone began in 1937, with 729 tons (value £1,650), followed by 497 tons in 1938 and 9,603 tons in 1939. The principal deposits, from which this ore was derived, are near Kennema, a town on the railway 180 miles from Freetown. The chromite, which occurs in lenses in serpentine, contains about 45 per cent. Cr_2O_3 ; it cannot compete with higher-grade ore from other sources in the ferro-chrome and chemical industries, but has found a market in the refractory trade. It is estimated that 80,000 tons are present to a depth of 70 feet, with unexplored reserves below. Ninety-nine natives were employed in 1937.

French West Africa

Similar deposits of chromite occur in French Togo, French Guinea, and Dahomey. The most important are those of Togo, occurring at Mount Djeti and to the north of Atakpame. The former occurrence, which contains at least 400,000 tons of recoverable ore, is only 12 miles from the railway and 120 miles from the sea. Deposits at Bontomo in Upper Dahomey, containing 36 to 47 per cent. Cr_2O_3 , also form lenses in Archaean serpentine. None of these ores has been exploited.

ILMENITE AND ZIRCON

French West Africa

At a number of localities on the Senegal coast, to the south of Dakar, the waters of the Atlantic have concentrated the heavy minerals of beach sands into strata of workable thickness. These black, heavy

mineral sands commonly contain 40 to 60 per cent. ilmenite and 10 to 20 per cent. zircon. Not only are the deposits readily exploitable, but after seasonal working they are to some extent renewed each year by wave action.

Production, which is principally from beaches in the neighbourhood of Rufisque and at the mouth of the river Casamance, rose from 5 tons in 1922 to 8,000 tons in 1929, after which a comparable output was not again reached until 1938 (7,354 tons). Most of the concentrate is treated in Europe, but since 1937, with the installation of electromagnetic separators in West Africa, it has been possible also to export some pure zircon and ilmenite. The ilmenite is utilized principally in the manufacture of titanium paints, while the zircon is employed in refractories and as a source of zirconium metal and its salts.

Sierra Leone

In Sierra Leone there are considerable deposits of high-grade ilmenite sand, containing a little platinum, in the vicinity of York and Hastings, between 10 and 20 miles from Freetown.

PLATINUM

Sierra Leone

Platinum deposits, situated about 15 miles inland from Freetown, have been worked on a small scale since 1929, and reached a maximum production of 750 ounces in 1935, which fell to 83 ounces in 1939. Large-scale development is unlikely. Of recent years the number of Africans employed has not exceeded 100.

OTHER MINERALS

Gold Coast

Small deposits of mispickel (arsenic ore), barytes, and molybdenum and tungsten ores are known in various localities, but none yet discovered has been large enough to work. Some tons of tinstone have been recovered by African women when calabashing for gold in stream gravels at Mamkwabi, Central Province, but reserves are small. A little salt is produced for local use from the saline springs at Daboya, Northern Territories, and is manufactured in the Ada and Keta districts, on the coast east of Accra, by evaporation of sea-water. Seepages of oil and bitumen occur in the Bonyere district, western Appollonia, but no deposit of commercial value has been

found. Poor quality oil-shales are found near Takoradi. Brick, pottery, and tile clays are widely distributed throughout the country.

Sierra Leone

Most of the above minerals have also been met with in Sierra Leone, but again the deposits at present known are too small in size to warrant development.

French West Africa

The salt deposits of Taoudenni in northern French Sudan and of Ijil, N'Terert, and elsewhere in Mauritania are of some domestic importance, since the salt forms the medium of exchange between the Saharan districts and the forest country to the south. The output is insufficient to meet the Federation's demands, and some 24,000 tons of salt are imported annually.

Several deposits of phosphate are found in Senegal, the largest at Cive, near Matam, on the Senegal river, and at Fandène, near Thiès. Development for other than local requirements is improbable. Leached guano from Alcatraz and other reefs off the French Guinea coast is sold to local banana planters.

Seepages which are located at Eboinda, near Assinie, on the Ivory Coast, contain at least 35,000 tons of bitumen suitable for road-making. A little copper has been exploited by the Compagnie Équatoriale des Mines from the Gaoua district of the eastern Ivory Coast, 180 tons of 35 per cent. ore being exported in 1937. Tinstone has been found on the Dahomey-Nigeria frontier, but not yet in commercial quantities. Deposits of rutile (titanium dioxide) occur in the pre-Cambrian gneisses of Dahomey, and beds of gypsum are intercalated with the Cretaceous limestones of Dakar.

Summary of Mineral Production

	<i>French West Africa</i>		<i>Liberia</i>		<i>Gold Coast</i>		<i>Sierra Leone</i>	
	1938	1939	1938	1939	1938	1939	1938	1939
Gold, fine oz.	127,220	*	1,902	6,536	674,927	782,271	30,012	33,657
Diamonds, ct.	61,928	56,314	*	*	1,296,763†	1,087,652†	689,621	600,000‡
Manganese ore 50%‡								
long tons	..	..	..	..	324,207	336,312	..	..
Chromite, long tons	..	..	..	..	..	..	497	9,603
Ilmenite-zircon,								
long tons	..	7,354	*	..	..	..	..	*
Iron ore	..	..	..	..	..	..	861,955	..
Platinum, fine oz.	..	..	..	..	..	..	180	83

* Data not available.

† Exports.

‡ Estimated.

CHAPTER X

AGRICULTURE

GENERAL SURVEY

AGRICULTURE is important in all parts of West Africa south of latitude 15° —that is, everywhere with three or more rainy months in the year—and is nearly always the chief, and usually the only, occupation of the people. Farther north, towards the desert, there are sometimes small patches of cultivation in favoured spots, but these are few and far between. In the agricultural area each family used to cultivate a portion of the land held communally by the tribe and, with the aid of many natural products, was self-sufficient in food, clothing, and building materials. The ways of native life are, however, beginning to change. European intervention in West Africa, the pacification of the country, the increased security, and the development of communications and trade have led to an increase of population and to a desire to purchase luxuries hitherto unknown. There is also a growing body of urban and industrial workers who have to be fed by the agricultural community. Export has encouraged concentration upon crops suitable for the purpose, and the neglect of those for local consumption. Thus, West African agriculture is ceasing to be wholly a matter of subsistence and is beginning an 'economic' activity. This tendency is affected by the arbitrary political boundaries of West Africa only in so far as one territory may offer greater political security and more economic opportunity than another.

Agricultural Zones (Fig. 67)

The four main agricultural zones of West Africa, like those of climate, vegetation, and fauna, run roughly from east to west; though along the Atlantic coast they are deflected towards the north.

(i) The coastal alluvium. This is a narrow belt along the coast, especially in the west, where the mangrove forest has been cleared in patches for the cultivation of rice and bananas.

(ii) The manioc zone. This lies inland of the coastal strip and includes the whole area south of a line joining Dakar, Bamako, Korhogo, Tamale (Gold Coast), and Kaduna (Nigeria); most of this zone has seven or more months' rainfall in the year. Agriculture is everywhere the dominant occupation.

(iii) The millet zone. This area extends from the manioc zone as far north as a line running from St. Louis through Nioro and Tillabéry to Lake Chad. Rain falls in more than three but less than seven months. Most of the inhabitants are engaged in agriculture, but stock farming is more important than farther south.

(iv) The sub-desert zone. This is an area in which agriculture ceases to be important, except in occasional areas where millet and

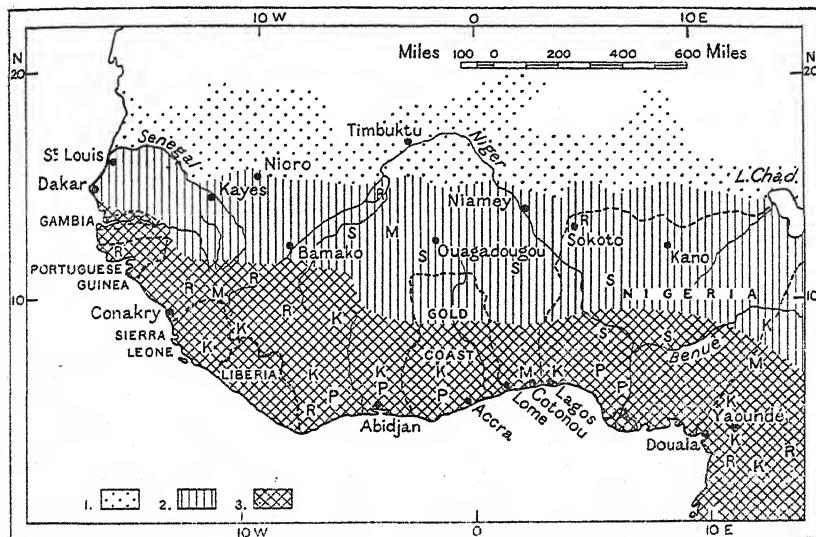


FIG. 67. Produce Zones

- | | | |
|---------------------|-----------------|-----------------|
| 1. Sub-desert zone. | 2. Millet zone. | 3. Manioc zone. |
| R, rice; | M, maize; | K, kola; |
| S, shea-butter; | P, oil palm. | |

vegetables can be grown. Cattle, sheep, and camels are common. The zone includes the irrigated areas of the upper Niger which depends upon European engineering.

Some areas are intermediate between the above types. Parts of the Guinea Highlands and the Fouta Jalon plateau, for example, have both manioc and millet zones, as a result of the modification of climate by altitude.

Soils

The soils of West Africa depend to a considerable extent upon the geological structure and consist for the most part of laterites and lateritic loams. They are generally of low fertility, and lack soluble phosphates and mineral elements, which have been removed by

'leaching'. There has also been much soil erosion as a result of extensive deforestation.

In undulating country the highest ground often has a red soil containing laterite conglomerates and gravels, but lower down the gravel becomes less obvious and finally disappears. The colour of the soil changes to orange, yellow, and then brown, and becomes greyish-black in the low-lying and often swampy areas. The lowland soils are fairly heavy, free from stones, and usually more fertile than those of the upper areas. Because of the proximity of the water-table they are sometimes cultivated during the dry season when the soil elsewhere is very hard and quite unworkable. This more or less regular gradation of soils is caused by erosion which leaves the concretions on the high ground and deposits the more siliceous material (clay) in the valleys.

The soils along the northern edge of cultivation are generally light and sandy. In the irrigated areas of the Niger valley black cotton soil occurs. This is a deep black soil which becomes very wet and sticky during the rains and produces good crops. It is either formed directly from the parent rock or is an advanced form of alluvium.

In the forest belt the surface soils often have more available mineral content and are less acid than the subsoil, because leaves and other organic matter decompose rapidly and so return to the soil the minerals taken from lower down by the tree roots. Under exposure and cultivation, however, forest soils rapidly lose their organic matter.

Land Tenure

The differences between African and European systems of land tenure, and the troubles which have arisen in consequence, have already been described. In Chapter VIII are given the legal and administrative arrangements in force in French West Africa today. So important to agriculture is this question, however, that a few remarks are necessary in this chapter.

Though the natives of West Africa are very firmly attached to the land, the idea of land-ownership in the European sense, as something that can be bought or sold, was, until very recently, completely foreign to them. They recognize, however, the importance of security in holding the land which they farm, and they have, therefore, very definite systems of land tenure of their own. The land belongs to the people, and each community has its own recognized boundaries. Sometimes the land is farmed communally, each family or household supplying labour in proportion to its size: this happens particularly

amongst primitive communities. More often, however, each householder is granted an area of the tribal lands which he and his family have the right to farm. If a man commits an offence against his tribe, or continually misuses or neglects his land, his holding reverts to the community. The size of these holdings varies greatly according to the type of crop grown and the amount of labour available, but the area actually devoted to crops is often only a small part of the whole. The average family probably has about 3 or 4 acres under cultivation in any particular year, but will have rights to collect wild products and to hunt over an area four or five times as great.

Trees which grow wild but give valuable fruits, such as oil palms, may be either individually or communally owned, though shea-butter trees are almost always regarded as the common property of the tribe as a whole. Individual ownership generally arises from the fact that the claimant planted the tree when he was farming the surrounding land: even though the land may now be farmed by another, the tree remains the property of the original farmer or of his descendants. Where trees are owned communally, the tribal elders fix the days for harvesting the fruits and each member of the tribe can then gather as many as he chooses.

Native communal land law is perfectly satisfactory under a complete subsistence economy, but it fails to provide the full security of tenure necessary when permanent or cash crops are being planted, or for farming on a large scale. Even amongst the natives there have been a number of instances of development in the direction of individual ownership, though, on the whole, changes in customary law have been less extensive in French than in British West Africa.

Methods of Farming

Methods of farming differ considerably in the various zones, but everywhere until very recently the native's primary concern has been to produce subsistence crops and collect natural food products. The practice known as 'shifting cultivation' is almost universal throughout at least all the wetter parts of West Africa. A piece of land is roughly cleared, valuable trees are left intact, the rest is coppiced, the debris is burnt, and the ashes mixed with the soil. Roots and stumps are left in the ground. The land is then sown and cultivated intensively for 3 or 4 years before being allowed to revert to bush so that it can renew its fertility. Meanwhile the farmer clears another patch near by and treats this in the same way. The resting period may be only for one or more years, where population is dense and

agricultural land in demand, but the usual period is 4 or 5 years. This period will, however, inevitably become shorter as land becomes less abundant than formerly, and as the production of cultivated crops for export increases. Clearings are more often in the high forest than in secondary bush, and the forest is, therefore, disappearing very rapidly in densely settled areas. The economically valuable trees such as oil palms, which are spared, are often damaged by scorching. Cultivated areas which have been abandoned and on which coppiced trees are growing can usually be recognized by the growth of oil palms in the manioc zone, and by the shea-butter tree and the African locust bean in the millet zone.

In the wet south the farmer clears his land towards the end of the relatively dry season (December to March) and plants his crops as soon as the heavy rains set in. Mixed cropping is common, and seeds are sown as closely together as possible. During the growing season there is a constant fight against weeds and undergrowth, and the area under cultivation must be small and intensively worked. The time of harvesting varies considerably with latitude, but usually takes place towards the end of the rains. With some crops two or more harvests may be possible in a year; with others, of slower growth, the one harvest may not be gathered in until November or December.

Farther north, with a much shorter rainy season, the farmer must cultivate as much land as possible if he is to produce sufficient crops for himself and his family from the one possible crop. He must, therefore, cultivate far more land for the same return. The long dry season facilitates the clearing and burning, or 'brushing', of the bush, weeds are less of a problem than in the south, and there is more time in which to relax. Furthermore, under the semi-feudal conditions which obtain as the savanna merges into the desert, he can often depend upon a considerable labour supply, in the form of freed slaves and their descendants.

Guinea corn (*Sorghum vulgare*) and bulrush millet (*Pennisetum typhoideum*) are usually sown together, but other crops, such as cotton, ground-nuts, rice, and sesame (benniseed), are generally planted by themselves. A fairly large area around the farmer's hut or compound is cultivated every year, fertility being maintained by refuse and by cattle which are herded there at night during the dry season. Outside this small manured centre, however, the northern farmer practises shifting cultivation in the same way as the peasant farther south, and does nothing more for the land than leave it to fallow.

Crop failure is everywhere a possibility in the drier parts of French West Africa. If the early rains fail the millet crop may be poor, and the guinea corn and cotton may suffer if the harmattan sets in early. Even when the crops do not fail completely, they may be sufficiently below average to make food very expensive in the following year.

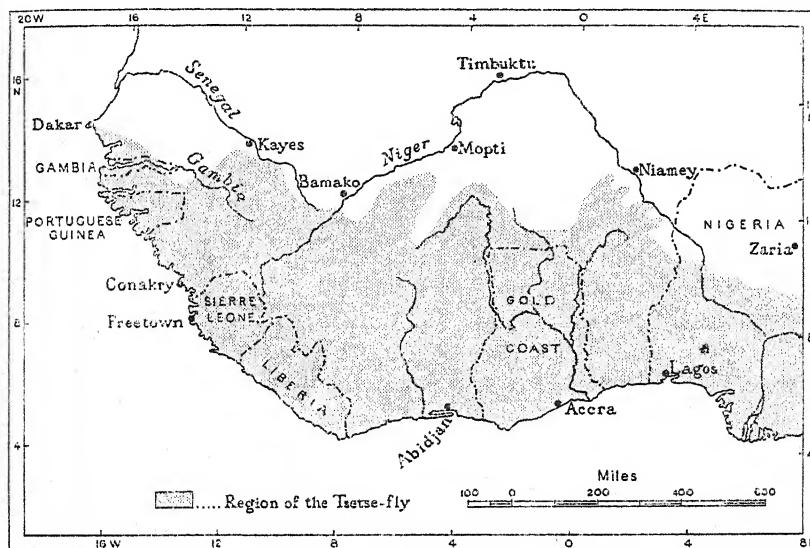


FIG. 68. *The Range of the Tsetse-fly*

Ground cannot be kept in permanent cultivation because of the prolonged dry season.

Between the northern and southern types of farming there is, reflecting some of the characteristics of both, a transitional area, in which farmers do not have to look as far ahead as those to the north, and suffer more from crop failure than the inhabitants of the forest belt.

Mixed farming is almost unknown in West Africa, since the presence of the tsetse-fly, at least during the rains, precludes the keeping of livestock (Fig. 68). It is beginning in the irrigated areas of the upper Niger, and might be possible in certain districts in the north of the millet zone. Here, however, the Fulani exercise a cattle monopoly, and the farmer can depend upon livestock to manure his fields only if the herdsmen, in exchange for grain, agree to keep their cattle on agricultural land at night. Near important trading centres

the droppings of pack animals, such as camels, donkeys, cattle, and horses, are often collected and taken out to the fields, but otherwise the people depend entirely upon bush fallowing. In the future leguminous crops may play an important part in West African crop rotations, and so help to maintain soil fertility. At the moment the enrichment of the soil constitutes one of the most important problems of modern agricultural research in West Africa.

Labour and Implements

Generally speaking, the West African farmer depends entirely upon his own and his family's exertions for cultivating the soil, and in most tribes there is a definite division between men's work and women's work. The men generally do the heavy tasks, such as the clearing of the ground and the main weedings, and help in the more difficult harvesting. The women usually undertake the planting, keep the land clean between the main weedings, and do the bulk of the harvesting and marketing of the crops. There are, however, great variations between the tribes. In some of the more primitive tribes, for example, women do a great deal of the heavier work done elsewhere by the men, whereas among strict Moslems the women are not allowed to do much farm work. Children often help on the farms, especially in scaring away birds whilst the grain crops are ripening.

Nearly all the work is done by hand, since draught animals can be used only in the relatively small areas which are free from the tsetse-fly, such as parts of the coastal plain and the drier and, therefore, less productive areas in the savanna. In spite of the intensive propaganda of the agricultural departments of French West Africa, there were only 7,000 ploughs in use in 1930, and the number is unlikely to have increased very considerably since that date.

The most common native implement is the hoe, the type of which varies greatly from district to district, according to the nature of the soil or of the crops grown, or of the local methods of cultivation. The wooden handle is usually short (seldom exceeding 24 in. in length) and forms an angle of about 60 degrees with the blade. The angle varies to some extent with the nature of the soils, being more acute when the soil is light, and more nearly a right angle where the soil is heavier. The blade is sometimes made entirely of hard wood, and sometimes of wood shod with an iron cutting-edge, but iron blades are now becoming increasingly common in all districts. Other important tools are the cutlass or matchet (*machete*), a combination of knife and axe, which is used for all sorts of purposes, and the native

axe with its very small blade. In recent years other implements, of European origin, have been introduced and widely adopted. These include the spade, fork, axe, pickaxe, and rake. Large farm implements remain too costly, however, for the ordinary native farmer. Furthermore, it would be difficult, and often impossible, to use ploughs or tractors, unless all stumps and tree-roots were first of all removed from land which had been cleared for cropping. Deeper cultivation might also lead to extensive soil erosion, which is largely avoided when the native merely scrapes the surface with his primitive implements.

Crops of West Africa (Fig. 69)

A large proportion of the crops grown by the natives of West Africa, including most of the foodstuffs, is not indigenous to Africa but has been introduced from Asia and America. Many of the introduced varieties have, however, been so successfully cultivated that they are now represented by well-adapted African types which sometimes grow wild.

The most important indigenous cereal crops are sorghum or giant millet, often called guinea corn or durra; bulrush or pearl millet; certain types of rice (*Oryza glaberrima*), and the so-called 'hungry rice' (two quick-maturing grass-like cereals). The chief native pulses and root crops include the cow-pea (*Vigna unguiculata*), the Bambara ground-nut (*Voandzeia subterranea*), and the West African yam, of which there are two main varieties, the white (*Dioscorea rotundata*) and the yellow (*D. cayenensis*). Oilseeds include sesame or benniseed (*Sesamum indicum*), probably a native of tropical Africa, and a similar plant, *Ceratotheca sesamoides*, which is peculiar to West Africa. In addition to these plants, the farmer also obtains many food and economic crops from wild trees and plants, such as the oil palm (*Elaeis guineensis*), the kola (*Cola acuminata* and *C. nitida*), the shea-butter tree (*Butyrospermum parkii*), and many varieties of leaf vegetables, from which are made the soups which form one of the main foods of West Africa.

The plants introduced from the New World have been brought by Europeans, especially the Portuguese, within the last five centuries. They came during, and largely because of, the slave trade. Slaves awaiting shipment had to be fed, ships had to be provisioned for the long sea voyage, and the ports of embarkation were in areas of heavy rainfall where local foods, suitable for storage, were difficult to obtain or otherwise unsatisfactory. The most important crops introduced

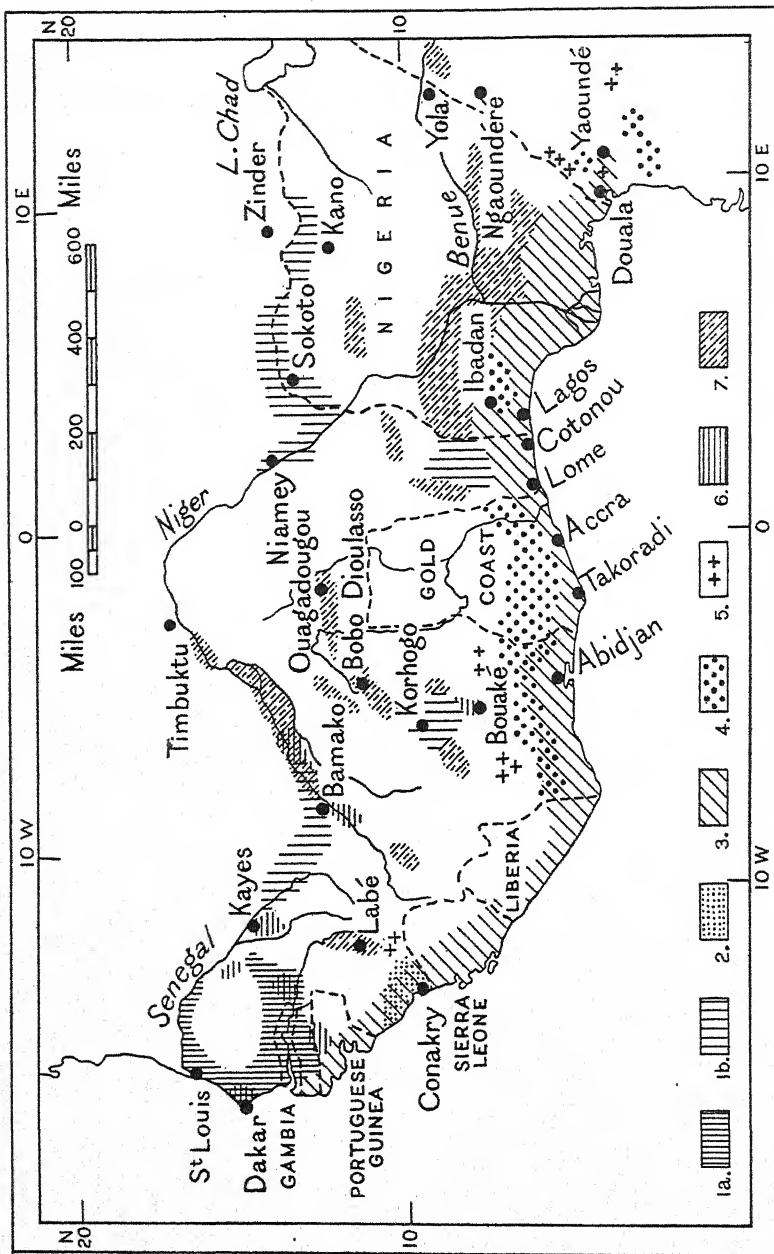


Fig. 69. Produce.
 1a. Ground-nuts (economic cultivation). 1b. Ground-nuts (subsistence cultivation). 2. Bananas. 3. Oil Palms. 4. Cocoa.
 5. Coffee. 6. Sisal. 7. Cotton.

were manioc or cassava, sweet potatoes, ground-nuts, maize, and Lima beans, together with valuable fruits and plants such as cashew, pawpaw or papaya, pine-apple, chillies, tobacco, and various types of cotton.

It is not known for certain when plants introduced from Asia first reached West Africa. It has been suggested that Asiatic hardflint maize (quite unlike the soft South American types) may have been brought back by pilgrims returning from Mecca: one of the Fulani names for maize, *maka*, is the same as that commonly used in India. Coconuts and citrus fruits were introduced more or less at the same time as the Portuguese were bringing new plants from America. Bananas also came from Asia to West Africa, from which they were later introduced to the New World. Asiatic rices have been introduced to West Africa, but only during recent years, and as yet they are grown only in a narrow coastal belt.

West Africa has received further additions to its crops in recent times. Cocoa is the most important of those grown by natives, who produce it for export, not for their own consumption. The other crops of economic significance, such as sisal, are mainly grown by Europeans.

Agriculture in the Coastal Alluvium

Agriculture in the alluvial areas along the coast is largely confined to the places along estuaries and backwaters where the mangrove forests have been cleared. Asiatic rather than African varieties of rice are grown on a considerable scale, mainly in French Guinea, where conditions closely resemble those in the neighbouring colonies of Sierra Leone and Portuguese Guinea. The soils are generally good, their fertility being maintained by the frequent deposition of valuable river alluvium, and yields are high. Bananas are also grown and form an important part of the native diet.

Agriculture in the Manioc Zone

The manioc zone is well watered and includes the main forest areas of West Africa. Agriculture takes place in innumerable clearings in the forest surrounding every village. The main subsistence crops are manioc, yams, and maize. Supplementary foodstuffs, such as bananas, ground-nuts, and beans, are widely grown, and wild products from the forest, particularly palm oil and kola nuts, are important. In modern times many cocoa plantations have been

established, especially in the Ivory Coast, and the products of the oil palm are valuable export commodities. Owing to the presence of the tsetse-fly, goats, pigs, and chickens are the only livestock.

Agriculture in the Millet Zone

The millet zone, with between three and seven wet months in the year, depends more upon cereals and less upon root crops than the manioc zone. The farmer is always fighting against time, and plants the slow-maturing crops immediately the first rains have fallen, without any previous cultivation of the soil. Besides the millets (chiefly guinea corn and the quick-maturing bulrush millet), maize is important in the wetter districts, and ground-nuts in the drier. Cow-peas are sometimes interplanted with these crops, and cotton is sown, usually as a pure crop. Farther north it is possible to grow only certain types of bulrush millet, ground-nuts, and cow-peas. The soil is frequently sandy and is easily disturbed by the winds during the dry season. As a protection, low wind-breaks composed of drought-resistant plants, such as *Jatropha curcas* and *Ziziphus jujuba*, are often planted at right angles to the direction of the harmattan.

Valuable products for local consumption are obtained from the shea-butter and baobab trees, but the main product exported from this belt is the ground-nut. The remarkable development of the ground-nut industry, especially in Senegal, is described in Volume II. Livestock are important in many districts, especially towards the north, where cattle, sheep, horses, and donkeys are common.

Agriculture in the Sub-desert Zone

The sub-desert zone, bordering on the desert proper, has ten or more rainless months in the year and a total rainfall of less than 10 inches. There is, therefore, little sedentary agriculture outside the irrigated areas of the Niger except occasionally along the north bank of the Senegal, at the foot of the Mauritanian scarp, between Nioro and Timbuktu, in the oases of Adrar des Ifoghas and Aïr, and north of Zinder. In the ouadis draining the hills water is obtainable even when the surface is dry, and vegetables and cereals, such as millet, wheat, barley, and rye, can be grown. For the most part, however, the people are pastoral nomads, owning large numbers of cattle, sheep, and camels.

EFFECTS OF EUROPEAN INTERVENTION

European intervention in West Africa is leading to a profound modification in agriculture as in other aspects of native life. Some of these changes, such as those involving land tenure, have already been described. Others spring from the increase of population which, in certain areas, causes pressure on the land and difficulty in maintaining soil fertility. Agricultural education, the establishment of Provident Societies, and the development of large-scale irrigation projects, are helping to improve, and sometimes to revolutionize, native agriculture; whilst plantations under European direction and control have become increasingly important during the present century.

Pressure of Population on the Land

The primitive agricultural methods of West Africa sufficed to serve the needs of a purely farming community, with unlimited land to till, but, as explained above, are beginning to prove unsatisfactory under present-day conditions. The population is beginning to press upon the available resources of the land in one or two parts of French West Africa, though not, as yet, seriously, since the densest rural population is only 65 to the square mile, and the average only about 8. The widespread practice of shifting cultivation does, however, demand a relatively extensive area for the individual farm, whilst that available for food crops alone is steadily diminishing, as plantation agriculture and the export of agricultural produce develop. The land has to be used much more intensively than hitherto, and cultivation must become permanent rather than intermittent.

Maintenance of Soil Fertility

One of the outstanding problems faced by the Agricultural Departments of both French and British territories in West Africa is that of the maintenance of soil fertility by means other than bush fallowing. Forest soils lose their organic matter very rapidly after clearing and cropping, but rapidly recover if treated with dressings of farm-yard manure or superphosphate. Experiments have shown that, if cattle manure is applied to the soil at the rate of about 2 tons per acre, crop yields can be maintained without recourse to bush fallowing. Unfortunately, for the reasons stated above, there are no breeds of livestock sufficiently immune to the tsetse-fly to permit the development of mixed farming on any appreciable scale in most parts of West Africa.

Green manuring—the growing of a crop (usually beans, peas, or clover) simply for the sake of turning it into the soil as a manure—has been tried with some success, especially in Nigeria. The Mucuna or Bengal bean (*Styzolobium aterrimum*) and the closely related velvet bean have given the best results. The latter is valuable, not only as green manure, but also as green fodder, silage, and cover crop. It is immaterial whether the crop is dug in, or burnt and added to the soil in the form of ash. The practice is not, however, popular with the African, since it involves more work, and more hands, for the production of the same quantity of food crops. Furthermore, this extra work has to be fitted, often with difficulty, into the ordinary mixed cropping routine; and in any case, amongst certain tribes, these crops are largely grown and owned by the women of the household, who would object strongly to any limitation of their prerogatives. Generally speaking, the native seems to prefer the hard work of making a new farm every few years to that of maintaining the fertility of his existing land. If he does grow cow-peas, it is generally for his own use and not for dressing the land.

The problem of maintaining fertility on plantations is tackled somewhat differently. This is best illustrated by the banana industry of lower French Guinea. Bananas make heavy demands on the mineral bases, especially the potash, in the soil. Their cultivation is largely confined to the valley bottoms which, in this area of high rainfall, contain large quantities of humus. The ground is well drained by deep open channels and the soil is deeply dug. After the planting of the bananas, the whole area is given a dressing, 2 feet thick, of forest leaves and twigs, and subsequently a heavy grass mulch is applied to the surface every six months. The mass of vegetation soon rots down and thus supplies the necessary mineral bases for the soil.

Development of Plantation Agriculture

One of the most striking results of European intervention is to be seen in the development of plantation agriculture under European ownership. The shortage of the labour supply and the land policy of the administration have tended to discourage European planters from undertaking large-scale operations. There are no extensive concessions comparable with those in French Equatorial Africa and the Belgian Congo. Concessions are, however, much more common than in British West Africa, the figures on 1 January 1938 being as follows:

	<i>Provisional (acres)</i>	<i>Permanent (acres)</i>
Senegal	7,744	9,956
French Sudan	17,816	27,379
French Guinea	38,973	18,115
Ivory Coast	124,017	104,195
Dahomey	1,685	3,064
Niger . . . . .	..	24
Total	<u>190,235</u>	<u>162,733</u>

Plantation production is usually on a commercial scale, and designed for export rather than for internal consumption. Most plantations are in areas of high rainfall suited to crops such as bananas, coffee, and cocoa. There are a few ground-nut plantations in Senegal, and some under sisal in the Kayes district. Africans own plantations in certain districts, but are tending to abandon crops like bananas for those which require less care and attention, such as cocoa, coffee, and oil palms.

Development of Irrigation

The establishment of great irrigation schemes is a special type of plantation agriculture which is revolutionizing the economic life of the inland Niger delta in French Sudan. It differs from other plantations in that it makes use of land which would otherwise be derelict, and is not devoted primarily to the production of foodstuffs. The project was undertaken chiefly to meet French demands for good quality cotton and to reduce the dependence upon foreign sources of supply (especially the U.S.A.). It was stimulated by the success achieved by the British Cotton Growing Association, formed in 1902 to provide against the same American monopoly, in Egypt, the Anglo-Egyptian Sudan, Uganda, and, to some extent, Northern Nigeria. The War of 1914-18 also showed the danger of undue reliance upon foreign supplies for a raw material essential to the manufacture of explosives.

The great Niger bend below Ségou with its fertile alluvial soils seemed suitable, if irrigation facilities were provided, for the production of American and Egyptian varieties of cotton superior to the short-stapled types grown by the natives. This was made possible by the opening of some of the channels along which the Niger formerly flowed.

The achievements of late years are described in greater detail in Volume II.

The success of the Niger project has suggested the possibility of

similar developments elsewhere in French West Africa. Thus in 1939 a scheme was put forward for the irrigation of 125,000 acres in the valley of the Senegal river near Podor. Owing to the war, however, no work has yet been done.

Native Provident Societies

In the last twenty years the French administration has encouraged the development of Native Provident Societies and has organized schemes for agricultural credit and rural education.

The administrative side of these societies is described on pp. 277-8. Their agricultural activities have included the distribution of nearly 50,000 tons of ground-nut seed in Senegal (including 3,500 tons of specially selected seed) and of 3½ million coffee plants and 157,000 cocoa trees in the Ivory Coast; the promotion of rice cultivation in Senegal and French Guinea; distribution of seed for the ordinary food crops and especially of quick-maturing and drought-resistant varieties; and the encouragement of reafforestation. Equipment for the destruction of parasites has been bought and sent round the various plantations. The livestock industry has been encouraged and model dairies established. Motor-presses and crushers have been provided on a large scale, and the societies' equipment for the boring of artesian wells had been loaned on 1,800 occasions up to the end of 1937. Better methods in the cultivation, preparation, and marketing of export commodities are also being popularized by these societies.

Agricultural Credit

Early experiments showed that the natives were not successful in the management of their own banks or credit societies. Local banks were therefore abolished in 1931 and replaced by the Bank of Agricultural Credit (p. 278).

Agricultural Education

In addition to the agricultural education done through the Provident Societies, there are, in most of the colonies, experimental stations, concentrating on the crops of the surrounding districts. The station at Bambey (Senegal), for example, specializes in ground-nuts, that at Ségou (French Sudan) in cotton, and those at La Mé (Ivory Coast) and Pobe (Dahomey) in the oil palm. Other stations are at Kindia and Kankan in French Guinea, Bingerville and Gagnoa in the Ivory Coast, and Niaouli and Ina in Dahomey. There are also two veterinary control stations on the borders of Niger, where all



64. *A stack of bulrush millet heads*



65. *Stooks of Guinea corn*



66. *Winnowing bulrush millet*



67. *Threshing rice*

cattle exported are inspected, vaccinated, and certified, and various animal-husbandry stations elsewhere, the most important being at Sotuba near Bamako.

AGRICULTURAL PRODUCTION

CROPS

Crop production may be roughly divided into two—production of food crops, and production for export—but no rigid line of separation is possible. Benniseed, for example, has been included in the first class, since it is primarily a subsistence crop, although an increasing amount is now exported. The oil palm, on the other hand, has been classed as an export crop on account of the dominant part played by its products in West African foreign trade; nevertheless, it too is a very important source of oil for native consumption.

Food Crops

The choice of subsistence crops depends generally on the climate (especially the rainfall) in the first place, and secondly upon the nature of the soil. Estimated production of food crops for local consumption in 1930 is given in Table I. More recent figures, when they are available, do not show any substantial changes.

Cereals

The most important cereals grown are the various types of millet, maize, and rice, though other crops, such as the temperate cereals, are cultivated in a few restricted areas.

Millets. Millets, the outstanding food crop of the millet zone, probably occupy $7\frac{1}{2}$ million acres in any one year. There are two main types, sorghum, often known as giant millet or guinea corn, and bulrush millet. Guinea corn is derived from a wild annual species of sorghum found only in tropical Africa, and many types with innumerable local varieties have originated in West Africa. It will grow on almost any soil, though it does best on heavier soils: lighter soils need to be heavily manured. It has to be in the ground for seven or eight months, in at least five of which there should be sufficient rain to keep it growing steadily. The seed is planted, therefore, immediately after the first rainstorm (usually April), without any previous cultivation. Sometimes it is planted by itself, but very often it is mixed with bulrush millet. The latter matures rapidly

and can be harvested early in August. The guinea corn grows particularly between August and the time of its harvesting in November or December, when its stalks may be 10 or 12 feet high. First the stalks are cut and laid in furrows, and then the heads are cut off and made into bundles. Grain is taken from the head later on, by beating. The average yield on native farms is 600–800 lb. of grain per acre, though on well-manured and well-cultivated land almost double these yields can be obtained.

The native likes growing guinea corn because it suffers little from disease or from the attacks of insect pests. Furthermore, every part of the plant can be used in some way. The flour is used for human consumption, and the bran is fed to livestock; the dried leaves are used as fodder; the stalks are used for building purposes and as fuel; even the chaff is used, being either fed to cattle or burnt so that the ashes will form valuable manure.

Bulrush millet—the *gero* of Northern Nigeria—is sown as a subsidiary crop with guinea corn in wetter districts, but under drier conditions guinea corn becomes too speculative a crop and only bulrush millet is grown on any scale. The advantage of growing the crops together is that it ensures against failure of one or the other should the rains fail at any particular time of the year. If the early rains are good, the bulrush millet usually does especially well, and the guinea corn suffers accordingly; but the early rains are very unreliable and, should they fail, the bulrush millet crop is poor. The latter can, however, survive considerable periods of drought once the seed has germinated. It is planted at the very first sign of rain, and will grow on almost any soil, though it prefers a well-drained light soil. The harvest is usually in August, so that it occupies the land for only 4½ months. Good yields average 800–1,000 lb. per acre on the head, giving 400–500 lb. of threshed grain.

Another type of *Pennisetum* (*P. spicatum*), known as *maiwa*, is also grown in many parts of West Africa. It closely resembles bulrush millet, though it is not so highly valued as a food crop, has smaller yields, and takes much longer to mature.

Millets are the main food crop, especially in Niger (where apart from peas and beans they constitute the bulk of the native diet), in French Sudan (where the only other food crops of any importance are sweet potatoes, maize, and rice), and in Senegal. South of the millet zone they give way to root crops, such as manioc and yams, and fruits like the banana, as in the much wetter districts of Dahomey and the Ivory Coast. Slow-maturing types of millet are grown,

AGRICULTURAL PRODUCTION

TABLE I
Production of Foodstuffs for Local Consumption in French West Africa in 1930. (Figures in tons.)

	Senegal	Dakar	French Guinea	Ivory Coast	Dahomey	French Sudan	Upper Volta ^a	Niger	Mauritania	Total
Millet	347,472	220	33,069	25,904	109,298	769,319	676,344	889,556	43,475	2,894,656
Yams	..	..	..	1,385,150	913,763	..	14,032	..	..	2,313,545
Bananas and plantains	35,108	..	55	55,115	1,525,048	488,723	31,482	29,762	..	1,552,810
Manioc	19,489	..	..	462,701	49,785	184,437	89,486	88,426	..	1,086,781
Maize	37,506	..	..	159,834	82,672	28	88,950	32,128	4,464	499,577
Rice	..	..	..	203,925	7,716	8,470	11,354	2	1,102	688
Fodder	12,919	..	..	..	..	60,910	25,820	5,550	112,545	..
Peas and beans	..	110	22,046	..	7,165	25,213	141,732	1,123	551	217,744
Sweet potatoes	..	..	..	196,209	115	..	..	..	..	198,059
Coco-yams	..	..	..	..	15,322	32,645	..	49,651	..	196,324
Ground-nuts ²	79,492	..	..	..	..	..	..	43,933	..	163,100
Cow-peas	..	..	..	..	..	..	..	..	10,472	54,495
Onions	..	..	..	..	..	..	..	4,850	..	4,850
Dates	..	..	..	..	..	..	..	..	715	2,866
Condiments	..	6	110	..	496	414	..	..	..	3,581
Wheat	..	..	..	..	..	..	..	..	..	1,026
Pimento	..	..	..	..	..	300	..	..	..	..
Barley	..	..	..	..	..	..	..	..	..	..
Squash	..	..	..	..	..	..	..	..	..	..
Potatoes	..	..	..	..	..	..	..	..	..	..
Other products	44,015	..	..	..	..	..	..	..	882	44,897
Totals	567,001	391	533,623	3,747,168	1,824,316	1,158,143	905,002	1,039,559	67,524	9,842,727

¹ Separate colony up to 5 September 1932, when its territory was divided between the Ivory Coast, French Sudan, and Niger.

^a Excluding production for export.

however, farther south, as for example in the wetter parts of Fouta Jalon, where they flower and ripen after the heavy rains have ceased.

Maize. Maize (*Zea mays*) is an important subsidiary food crop in both the manioc and millet zones, occupying a total area of about 1 million acres. It is grown in Dahomey, the Ivory Coast, French Guinea, and in the south of French Sudan. It is singularly free from disease and insect pests, and, provided it is grown on reasonably good soil, lack of rainfall is the only cause of poor crops. Like bulrush millet farther north, it is planted with the earliest rains and is the first food crop to be harvested. Where water is abundant maize can be sown at any time, but generally it is planted in late March or early April, and is ripe by August. Some is harvested earlier when it is still green, since it then forms a far more palatable food, whilst the women avoid the long and difficult task of reducing the hard ripe grain to flour. Where there is a break in the rains (generally in August) late maize may be sown when the rains begin again and harvested in December or January. Yields of late maize are usually less than half those of the earlier crop, which, even under the poor native methods of cultivation, gives 1,000 lb. or more of grain per acre.

Rice. A cultivated rice, *Oryza glaberrima*, is derived from a tropical African wild species, *O. barthii*, which is quite distinct from the common Asiatic type, *O. sativa*, now being grown increasingly in West Africa. Cultivation has been considerably extended in recent years, though, except in one or two areas such as French Guinea and the Casamance valley in Senegal, rice is still something of a luxury to most West Africans. All the many local varieties have grains with red skins and so are unsuitable for export, even if cleaned by machinery. Both 'hill' and 'swamp' varieties of rice are grown, usually under rather primitive conditions, which give poor yields. Hill rice is often grown between the mounds or ridges made for other crops, and receives no special cultivation. Although often known as 'upland' or 'dry land' rice, good yields are obtained only if water is abundant. Swamp rice, on the other hand, needs to stand in water continuously, and is, therefore, the important crop in river valleys. The land is usually prepared during the dry season by breaking it into clods which are left to bake in the sun. When the rains and floods have begun to break down these clods, the seeds are sown broadcast and quickly germinate. Later the floods recede, the fields dry out, and the grain ripens. The yields of rice depend largely upon the height and duration of the floods, but the average is

probably low—only 600 to 800 lb. of paddy (rice in husk) per acre.

In recent years considerable areas of the mangrove forest belt of French Guinea have been cleared and used for rice cultivation. After the laborious task of clearing the trees and destroying the roots, the land is levelled and fields are laid off, surrounded by 'bunds' or banks of earth. The seed-beds are prepared on upland sites, where rice is planted in the first rains and later transplanted to the fields. By this time the rivers are beginning to flood, and each high tide banks up the fresh water which overflows on to the surrounding land. The water runs off as the tide falls and comes up again with the next high tide. The bunds are necessary so that water can be held in the fields if there is a break in the rains. This precaution is especially important in the upper reaches which are flooded only at spring tides.

Rice is to be the main cereal grown in the irrigated areas of the upper Niger, and a swamp rice, *dici*, and an upland rice, *fossa*, have been introduced for the purpose. Eventually there are to be 12,300 acres under rice around Baguinéda, and nearly 20,000 acres at Kokry in the Sansanding irrigated area. Yields of more than 2,000 lb. per acre have been obtained.

Other Cereals. The two quick-maturing varieties of 'hungry rice' grown in West Africa have already been mentioned—*Digitaria exilis* is common in the western section from the Gambia southwards to the Gold Coast, and *D. iburua* is grown in Niger around Zinder and along the northern borders of Nigeria. The latter is known by the Hausa as *iburo*. Both grains are very small and are used by the natives as porridge: for Europeans 'hungry rice' is a good substitute for semolina. Wheat, barley, and rye have already been mentioned as crops of the sub-desert zone. Wheat is usually sown in November or December and harvested in March, when it is succeeded by barley, rye, or millet.

Root Crops

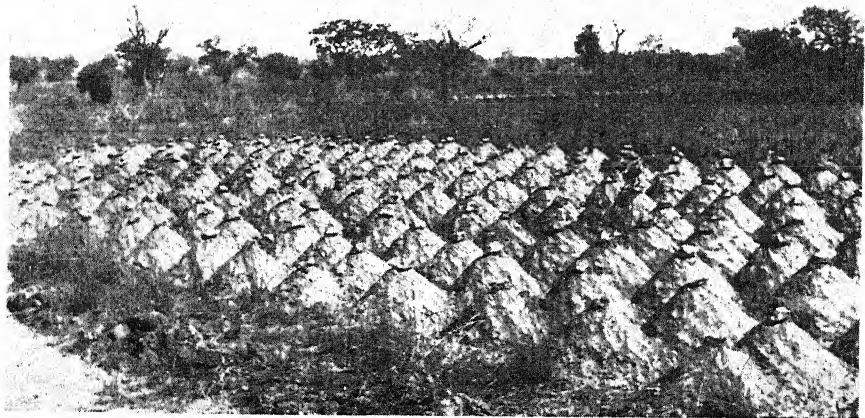
Manioc. Manioc or cassava (*Manihot* sp.) is grown in most parts of French West Africa, occupying more than 1 million acres, though only in the 'manioc zone' (the forest belt and north to 7°) is it of outstanding importance. In Dahomey it is the leading food crop after yams, and in the Ivory Coast it ranks after bananas and yams: elsewhere, and especially in the drier parts, it is grown on only a limited scale. Manioc can, however, withstand considerable drought, if necessary; and, since it is also unaffected by locusts and needs little

attention, it is generally grown. As it makes less demands on the soil than the yam, it is often the last crop grown in a rotation before the land is allowed to revert to bush. Manioc is a shrub which grows to a height of 8 or 10 feet and has tuberous roots in clusters weighing from 20 to 30 lb. There are two main types: the sweet or dark-coloured (*M. palmata*), and the bitter or common (*M. utilissima*), which has light-coloured roots and is poisonous when raw, so that it must be soaked for at least twenty-four hours before being eaten. Both types are grown from cuttings off old stocks, which, in the south, are given no further cultivation after planting. In the drier north manioc is given more care, as it is one of the few crops which will grow during the rainless period. Special ridges are made for the plants and the fields are surrounded by low fences to prevent livestock from damaging the crop. Weeding is also done at fairly frequent intervals. The roots may be dug after five or six months, and cooked and eaten like potatoes. Often, however, they are left in the ground for two or more years and then made into meal (*fufu*) by a laborious process of soaking, boiling, drying, grinding, and sieving. The meal is either baked as bread or boiled in dumplings for stews and soup. The roots may also be split, dried in the sun, and then stored.

Yams (Plates 68 to 71). Yams (*Dioscorea* sp.) constitute an important food crop in most of the wet coastal areas of the gulf of Guinea, especially in the Ivory Coast and Dahomey. The varieties of yam are innumerable, most districts having some especially popular type, though the differences between the varieties are usually slight. The crop occupies the land for most of the year and is generally planted in late November or December. If sufficient land has not been prepared by then, yams can also be planted when the rains begin in March or April, though yields will be much smaller than with those planted earlier. The preparation of the ground for yams is a long task, requiring deep and thorough cultivation. Yams are generally planted on conical heaps or hills, which are usually from 2 to 4 feet high according to the depth of the soil, and from 3 to 4 feet apart: there may, therefore, be as many as 2,000 hills per acre. A clod of earth is often placed on the top of each hill to check erosion, but is replaced by a twist of dried grass when the seed yams are planted near the top of the hill. Other crops, such as maize, beans, cow-peas, and Bambara ground-nuts, are often sown on the slopes of the yam hills. As the yam vines grow, they are supported on the stems of the bushes and trees left when the land was cleared, or on stakes put there for the purpose. Guinea-corn stalks are used as stakes in some



68. *Preparing yam mounds*



69. *Yam mounds*



70. Building a yam rack



71. A yam store

districts. The crop is harvested by the removal of the tuber from the hill without disturbing the vine, often weeks before the vine dies. Several small tubers then grow in its place and these can be used as next year's seed crop. The yams are stored by tying them to wooden racks where they are shaded from the sun but exposed to the air. Sometimes they are left in the ground until required, but this prevents any secondary growth of tubers.

Yams vary greatly in size, and the largest may weigh up to 50 or 60 lb. Small yams are often roasted and eaten whole like potatoes, but large ones are pounded and the fibre partly removed. The pounded mass is then boiled, or put back into the outer shell of the yam and roasted. There is a considerable internal trade in yams and also in yam flour and dried slices.

Other Root Crops. Sweet potatoes (*Ipomoea batatas*) are grown in many parts of West Africa, but they are more than a minor subsidiary food crop only in some of the areas which are too dry for yams. They are most common in French Sudan and, to a less extent, in Dahomey, French Guinea, and Senegal. They are usually planted on ridges and will continue to grow even in the dry season. Almost any soil will give yields of 3 or more tons per acre. The coco-yam or *koko*, sometimes known as 'taro' (*Colocasia antiquorum*), is widely grown, especially where there is too much shade or moisture for other crops. A newer coco-yam (*Xanthosoma sagittifolium*), introduced in 1843, is now common in the Gold Coast and Sierra Leone. The crop is propagated in the same way as yams but grows either on the flat or on ridges. It is a starchy food like sweet potatoes or yams, and needs cooking or repeated washing to remove an acrid substance in the tuber.

Other Food Crops

Peas and Beans. Peas and beans are grown on all West African farms, usually interplanted with other crops. The most common are pigeon peas (*Cajanus cajan*), cow-peas, sword beans (*Canavalia ensiformis*), and the many local varieties of beans of the species *Phaseolus lunatus*, such as the Lima or butter bean. The African yam bean (*Sphenostylis stenocarpa*), grown in some areas as a root crop, gives the common brown bean of the wetter parts of West Africa. Generally speaking, beans grow in the wetter south and cow-peas in the drier north. They are usually planted in the middle of the rains and so often occupy land which is about to be cleared of its other crops and would be unoccupied but for these crops. As most of the beans and peas

are speckled or coloured, they are unsuitable for export, but there is always a large internal demand. Increased cultivation would not only increase the food supply, but also help to maintain the fertility of the soil.

Besides the ground-nut of commerce, two other ground-nuts are cultivated in West Africa for local consumption, and not for export—the Bambara ground-nut and the Geocarpa or Hausa ground-nut (*Kerstingiella geocarpa*). Both form pods containing beans beneath the ground, like the ground-nut. The former is the more widespread: the latter, which is peculiar to West Africa, is mainly confined to the upper valleys of the Senegal and Niger.

Vegetables. Vegetables are usually grown on the small area which surrounds every compound and is heavily manured by refuse. They include gourds or calabashes, which can be made into bowls, bottles, and other household utensils, onions and shallots, tomatoes, okra (*Hibiscus esculentus*), and sorrel or roselle (*Hibiscus sabdariffa*). The fresh leaves, the fleshy calyx, and the dried seeds of the last named are all used for making soups.

Miscellaneous. Sugar-cane is a widely scattered crop, growing under highly varied conditions, though seldom occupying much space. The canes are chewed by the natives. No sugar is manufactured.

Benniseed is the most important cultivated oilseed. It is probably a native of tropical Africa and is grown especially in French Guinea and the Ivory Coast. There was an export of over 850 tons in 1936 and 423 tons in 1937. The closely related *Ceratotheca sesamoides*, which is peculiar to West Africa, gives an oil very similar to that of benniseed. Its leaves are commonly used for soups.

The fertile areas around the compounds produce crops other than vegetables, which, although not all foodstuffs, all satisfy some domestic need. They include fruits, tobacco, peppers, especially capsicum or pimento ("Guinea pepper"), indigo and henna for dyeing, fibre plants such as cotton for spinning and weaving, rama or da (*Hibiscus cannabinus*) for making rope and twine, and plants for stupefying fish so that they can be caught easily. Some of these products can also be gathered wild, and in certain cases a small export trade has developed.

Export Crops

The food crops described above are grown, to some extent, in all parts of agricultural West Africa, but the crops and products most important in the export trade do not occur so extensively. General features only, therefore, are discussed here.

Two types of products may be distinguished: those which are cultivated, such as ground-nuts, cocoa, coffee, bananas, and sisal, and those which are found growing wild and are collected. The latter include the products of the oil-palm, kola, and shea-butter trees, which in many instances are given sufficient care and attention by the African to justify their being regarded as 'semi-cultivated' crops.

Cultivated Crops

Ground-nuts. Ground-nuts (*Arachis hypogaea*), also known as monkey-nuts and pea-nuts, constitute by far the most important commercial crop of French West Africa and are also grown widely as a food crop, especially in the millet zone between latitudes 8° and 14° N. Conditions are favourable for their growth almost anywhere in West Africa; but, since they normally command only a low price, export is possible only from areas well served by communications. Most of the exports of the French territories come from Senegal and, to a less extent, from French Sudan. Cultivation, both for local consumption and for export, is entirely in African hands.

Ground-nuts do best on light and preferably sandy soils, as the young fruit has to push its way into the soil before maturing. There are two types of plants, the spreading or 'runner', and the erect. Both of the common Senegal varieties, the 'Rufisque' and 'Cayor', are runners with small, and usually two-seeded, pods. They are generally grown by themselves, though sometimes, especially in the interior, interplanted with a few rows of bulrush millet. In Senegal they are sown in June or early July, harvested in October or November, and marketed in December or January. They need plenty of rain and sunshine and careful weeding and cultivation in their early stages.

The nuts stay fresh longer in the shell, and unshelled nuts are essential for the production of the high quality 'Rufisque' oil, but for more general purposes shelled nuts are satisfactory, and shelling, which saves transport, has therefore developed considerably in interior districts during recent years.

Cocoa. Cocoa (*Theobroma cacao*), unlike the ground-nut, is grown entirely for export. It comes mainly from the rain-forest belt of the Ivory Coast, the climate of which closely resembles that of the neighbouring cocoa-producing colony of the Gold Coast. Although cultivation on any scale dates only from about 1912, production for export has exceeded 50,000 tons in several recent years from the Ivory Coast alone (especially the Indenié province). The southern

part of Dahomey is another producing area. Since 1930 European plantations covering 37,000 acres have been established in the central and north-western parts of the Ivory Coast, but cocoa is, and is likely to remain, predominantly a native crop.

Cacao trees require abundant moisture and, when young, need shade and protection from strong or drying winds. They are, therefore, often sheltered by oil palms or bananas, which later on, as the cacao trees become stronger, can be removed. The trees need little attention apart from the regular pruning of all but the main branches. Fruit is borne after about 5 years, and continues thereafter for 20, and even 30, years in succession. The pods are cut from the trees, piled up in heaps, and left for several days. They are then cut open, and the beans, with their surrounding mucilaginous material, extracted. The beans are next fermented by putting them in heaps covered by leaves, and occasionally stirring them. After six or seven days they are dried. As the commercial value of the product depends almost entirely upon the care with which the beans are prepared, much attention has been given to this aspect in recent years. Produce inspection was instituted in 1929 for cocoa, as well as for other export products such as coffee and palm kernels, and, as a result, many old practices (such as the drying of beans over open smoky fires, a method still widely practised in the French Cameroons) have almost disappeared. The crop is prevented from going mouldy by quicker and more thorough drying, and by the provision of better and speedier transport. Agricultural schools are teaching the natives new and better methods of cultivation and preparation.

Coffee. Coffee trees (*Coffea*) grow wild in many parts of the forest belt of French West Africa as far as 8° N. latitude, and *C. liberica*, *C. kouilou*, and *C. robusta* are now grown commercially, though only in the Ivory Coast on any scale. *Arabica* has been successfully introduced to the Man mountains of the Ivory Coast; and the Sierra Leone upland variety, *C. stenophylla*, grows widely in French Guinea. *C. excelsa* is grown in the eastern Ivory Coast. The first variety cultivated was *C. liberica* in the western Ivory Coast, but production has spread widely and other types are now of greater importance, notably the disease-resisting *Assikasso* or *Gros indiené*. The cultivated area under coffee exceeds 170,000 acres.

Coffee-growing was purely a European enterprise until the early thirties, when the Provident Societies, encouraged by the Administration and by the protected prices offered for coffee in France, began to distribute thousands of seedlings to African farmers. As the



72. *Irrigation for cotton*



73. *A sisal plantation*



74. *A cacao plantation*



75. *A farm school*

Africans were ignorant of the methods of growing coffee, disease became rife and ruined enormous numbers of their trees, besides threatening the European plantations. Production for export has not, therefore, increased as much as was at one time expected, and in 1939 was only about 15,000 tons. Since 1938 the inspection of shipments of coffee, nearly all of which goes to France, has been carried out much more strictly than formerly.

Fruits. Tropical fruits grow in abundance in French West Africa. The banana and the plantain are of outstanding importance both as native foodstuffs and as crops grown for export. As a commercial crop bananas are grown almost exclusively upon European plantations in French Guinea and the Ivory Coast. The most important centre is Kindia, 80 miles from Conakry by rail. The only type grown for export is the dwarf Chinese banana (*Musa nana*). There are cooled warehouses for bananas in Conakry and Port Bouet, from which specially built banana boats take the fruit to Nantes, Bordeaux, and Le Havre. France offers a special tariff and so takes the bulk of the export. West Africa has a particular advantage in this trade owing to its relative proximity to European markets, though further expansion is improbable because of the difficulty of building up an adequate and reliable labour supply.

The plantain, unlike the banana, is eaten cooked. It is gathered green and eaten boiled, baked, stewed, or fried in oil, or else is cut up in slices and dried in the sun for use when required. It is a staple food in many districts in the Ivory Coast and Dahomey, where the banana is also highly valued as a food.

The pine-apple is another important fruit which flourishes in the drier parts of the forest belt. In Fouta Jalon a citrus-fruit industry is being developed, and before the war increasingly large quantities of sweet Guinea oranges, or mandarines, and of orange essence, were being sent abroad. The West African grapefruit, however, is too seedy to compete in the market with varieties from elsewhere.

Cotton. It is not known whether cotton (*Gossypium* sp.) is indigenous to West Africa or not, but it has certainly been grown by Africans for their own weaving industries for centuries. Before the development of the scheme for growing cotton under irrigation in the upper Niger, only short-stapled varieties, unsuitable for European industry, were produced, especially in the Ivory Coast and French Guinea. The most successful types are the Ishan, Budi, and Allen varieties, but yields are highly variable, and the methods of cultivation very poor. Cotton is usually sown with other crops and given little

or no attention, whilst the picking and preparation is often done haphazardly by women and children. In many districts cotton has to compete with export crops which offer better remuneration. As a result of the Niger scheme, however, total production has increased considerably in the last twenty years, and the export trade has been greatly developed.

Sisal. There are three large European sisal (*Agave sisalana*) plantations started at the beginning of the present century. The largest, in the valley of the Senegal near Kayes, stretches for 12 miles along the river and was to be further extended in 1939. There is another plantation at Bamako, and new plantations have been established within the last ten years in the Ivory Coast (at Badikaba, near Firkessédougou), in French Guinea (near Kouroussa), and in Senegal (at Kolda on the Casamance). Native production is being encouraged in the neighbourhood of these plantations, the Europeans providing the seed and buying the crop. Yields are only half those obtained in British East Africa, but there is a steady export, of which the United Kingdom takes about one-third.

Forest Products (Plates 76 to 79)

Oil Palm. The oil palm is a native of West Africa and thrives in the moist climate of the forest region, though it is rare in the dense forest itself. It is particularly common where the forest thins out, especially towards the sea, and where the natives have destroyed the forest by shifting cultivation. Although much has been done to improve the tree in special plantations, it is still mainly a wild product. The only European plantation to survive is near Dabou in the Ivory Coast, and although in bearing in 1936 it was being used only for experimental purposes. The oil-palm industry is, therefore, almost exclusively in African hands in French, as in British, West Africa, and in many districts the tree constitutes almost the sole source of money income for the native.

The tree reaches a height of 40 to 60 feet when fully grown. The orange-red fruits (about the size of small plums) grow in eight or more large bunches or 'heads', each weighing up to 50 lb., in the crown of the tree. Beneath the outer skin of the fruit is a fibrous pulp, or pericarp, surrounding a hard woody nut in which the kernel is contained. Palm oil comes from the pulp and is the chief source of native oil. The kernels give palm-kernel oil, though they are seldom used by the natives but sold to traders for export to Europe and North America. The tree also provides palm wine,



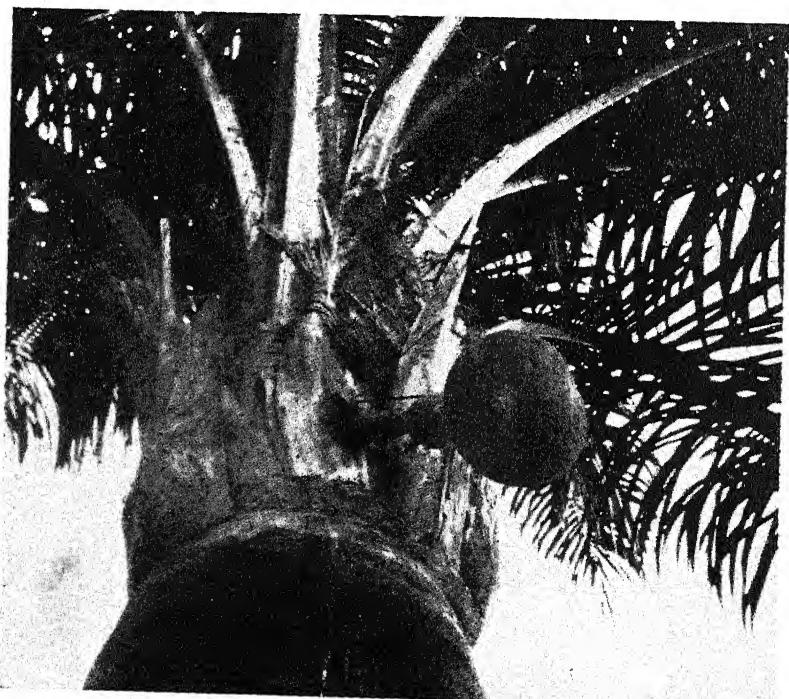
76. Cracking palm-nuts



77. Pounding palm-oil



78. Boiling shea-nuts and skimming off the butter



79. Tapping for palm wine

a popular African drink, though this can be taken only at the expense of the tree itself. The women prepare palm oil by separating the fruits from the head and boiling them in water. The oily mass is pounded and worked in water until the oil rises and can be skimmed off: the oil is then sieved and heated again to remove all trace of water. The kernels are taken from their shells by the women and children, and sometimes the old men, each nut being laboriously cracked with a stone. There are also a few mechanical crushers and presses in the Ivory Coast and Dahomey. Oil is expressed from them in large plants and is used in the manufacture of margarine, cooking fats, the better quality soaps, glycerine, and paints.

Because of the large internal consumption of palm oil, palm kernels constitute the bulk of the trade of many districts, especially in Dahomey, from which comes more than half of French West Africa's total output. The native methods of obtaining oil-palm products in Dahomey, especially in the south, are said to be superior to those of any other part of Africa.

Shea (Karité). The shea-butter tree is a typical savanna tree which occurs throughout the millet belt and is to the interior what the oil palm is to the coastal areas. It flourishes especially in the neighbourhood of villages, where it escapes the grass fires of the open bush, though there its corky bark provides some protection. Altogether there are probably 17 million trees in French West Africa. The trees shed most of their leaves in the dry season and drop their fruits in May. The fruits contain one or two nuts embedded in a sugary pulp which is edible when ripe. Shea butter (*graisse de karité*) is obtained from the oil in the kernels of these nuts. It is sold in the native markets in the form of yellowish loaves, rather like oily cheese. It is used mainly for cooking purposes, but also as an illuminant, ointment, soap, and hair-dressing. There is a growing export of shea products, chiefly to France.

Kola. The kola, a common wild tree in well-watered districts, gives a nut which is much appreciated by the African as a stimulant. The nut, about the size of a chestnut, may be white, red, or pink. The white is preferred, generally commands a much higher price, and has special significance in social and ritual belief. These nuts are exported to drier, more northerly, parts, where they are very popular. Of recent years the United States have begun to import kola nuts and plantations have been established to deal with the demand. Nearly 500,000 acres and over 8 million trees have been planted in French Guinea and the central districts of the Ivory Coast during

recent years, and the export figure will, therefore, probably increase greatly in the future.

Coconut. The coconut palm (*Cocos nucifera*) is not very common in West Africa except in some of the coastal districts with 50 or more inches of rainfall a year. The produce is mainly used locally.

Rubber. In the past there was a small export of rubber from the indigenous trees (*Funtumia elastica*) and lianes (*Landolphia heudelotii* and *L. owariensis*). Some plantations (mainly native-owned) of Para rubber (*Hevea brasiliensis*) were also established. Despite export premiums to rubber producers in some recent years, however, the export trade has remained small.

Timber. The timber industry is hampered by difficulties of transport and is important only in the Ivory Coast. Here at least 30 million acres are available for exploitation. In recent years much land (over 8 million acres in 1940) has been reserved as forest land, on which cutting or burning is prohibited without authorization.

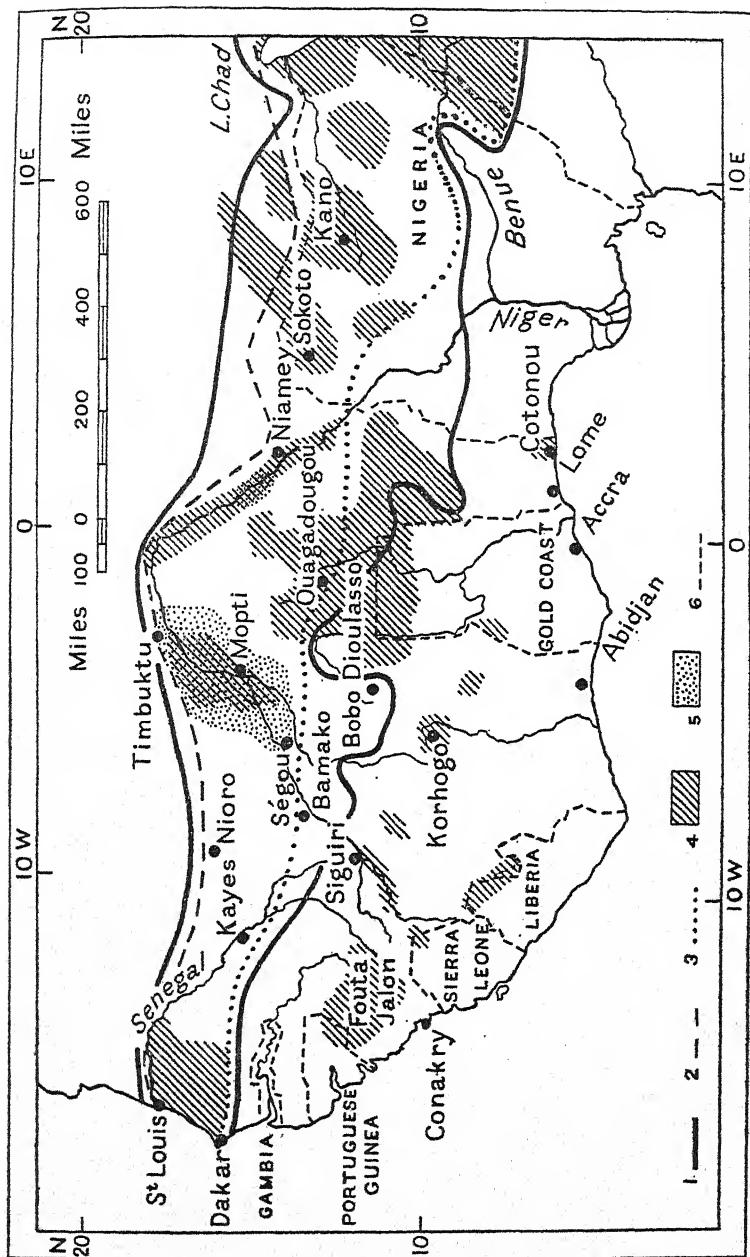
Gums. Gum copal is gathered from the copal trees of French Guinea during the dry season. More important is the gum arabic obtained from the *Acacia senegal*, often called the *verek*, a common tree in the drier parts of West Africa, especially in northern Senegal and Mauritania. The quantity exported varies from year to year. Plantations have been established at Podor on the Senegal river.

Kapok. The silk-cotton tree (*Ceiba pentandra*, *Eriodendron* and *Bombax* sp.), from which kapok is obtained, grows in many districts, especially in Togo and the Ivory Coast. The silky down surrounding the seeds, impervious to moisture and very light, is used for cushions and life-belts.

Castor-oil Seeds. These seeds are obtained from the castor plant (*Ricinus communis*) which grows wild or semi-cultivated in many districts. They are produced on a commercial scale only in Dahomey.

LIVESTOCK (Fig. 70)

Because of the tsetse-fly stock-raising plays only a minor part in the native economy over all the wetter parts of French West Africa, and only in the dry north are livestock of any great importance. Horses, donkeys, and most breeds of cattle cannot live in the tsetse-infested areas, though most households own a few sheep and goats with possibly some pigs and poultry. Table II gives a conservative estimate of the numbers of livestock in French West Africa in 1938, and shows their regional distribution:

FIG. 70. *Livestock*

1. Horses (N. & S. limits).
2. Camels (S. limit).
3. Cattle: Zebu to N., Humpless to S.
4. Cattle, main areas.
5. Fleecy sheep.
6. International boundaries.

TABLE II

(Figures in thousands)

	<i>Cattle</i>	<i>Sheep and goats</i>	<i>Horses</i>	<i>Donkeys</i>	<i>Pigs</i>	<i>Camels</i>
Senegal ¹	310	100	36	50	14	6
French Sudan	1,270	4,900	158	150	..	33
French Guinea	430	200	2	..	3	..
Ivory Coast	240	900	16	30	36	..
Dahomey	180	400	2	0.5	37	..
Niger	760	2,700	63	160	..	55
Mauritania	210	1,800	3	60	..	67
Totals	3,400	11,000	280	450.5	90	161

¹ Figures for Senegal do not include cattle, horses, donkeys, and camels under 3 years old.

Cattle. Cattle, though easily outnumbered by sheep and goats, are the most important stock in West Africa and may be roughly divided into two types—the zebu of the north and the humpless cattle of the south. The former are owned by the nomadic Fulani, and are big-boned animals of the Asiatic zebu or long-horned Egyptian types which have never acquired immunity from the tsetse-fly. They must, therefore, be taken north towards the desert to avoid the dangerous rainy period. Formerly the Fulani measured wealth solely by the size of their herds, and many of them do so to-day, although the number of true nomads, or 'cow Fulani', is now relatively small (only 300,000 out of a total of about 2,000,000). When they want money they sell bullocks or animals no longer useful for breeding, and these animals form the main meat supply of West Africa. Some of the movements of these cattle are shown in Table III. In the past rinderpest epidemics often occurred, and black quarter and pleuro-pneumonia are still common. The veterinary services, which have a personnel of 300, including 50 Europeans, have been active, however, and sera are now available for the inoculation of stock against these diseases. Injections for the treatment of trypanosomiasis are also given at the veterinary camps established at various points each year during the dry season. Over 5,000 tons of cattle hides were exported from West Africa in 1937, 2,800 tons coming from the French territories.

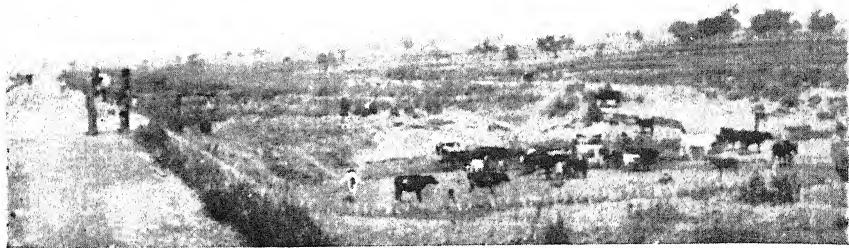
Humpless cattle are found south of a line running roughly from Dakar in the west to Kano in the east, while still farther south in the forest belt there exists a type of dwarf cattle which appears to be almost immune against the tsetse-fly. These dwarfs serve little



80. *A field of calabash gourds*



81. *An African locust-bean tree*



82. *Humpless cattle*



83. *Fulani with humped cattle*

economic purpose and are kept purely for ceremonial purposes and for dowries. The humpless type may be a cross between the zebu and the dwarf. It is most common in French Guinea, Dahomey, Togo, and the north of the Ivory Coast. Humpless cattle are not wholly immune to trypanosomiasis, but have developed a considerable degree of resistance and can live in tsetse-infested areas where the larger animals of the north would quickly die. They are very docile and are allowed to roam, more or less at large, during the day, when they often do much damage to the crops.

Veterinary work in French West Africa has concentrated on the elimination of diseases, but an attempt has also been made to evolve a cross useful both for dairy and draught purposes. Charolais and Breton bulls are used. The use of oxen as draught animals and the advantages of mixed farming are taught in the agricultural schools, and castration of unsuitable sires is being widely encouraged.

Sheep and Goats. Four-fifths of the animals slaughtered for meat are sheep and goats, which in the south form almost the only source of meat for the natives. There are several distinct types. Those in the forest belt are small with short legs as compared with the large and leggy animals of the savanna. The sheep are hairy, not woolly, except for the breed known as the 'Macina' in the Niger bend. This type is being improved by the French authorities by cross-breeding with Australian, South African, and French (Arles) merino varieties, but in 1937 French West Africa exported only 544 tons of wool. Chamois rams are being used to improve the quality of the meat. Alpine goats have been imported and crossed with the local types of goat. Sheep and goat skins are exported, though many of them are spoilt by disease and bad flaying. Little attention is given to these animals, which roam at large during the day in the dry season and are only folded during the rains to prevent them from damaging the crops. Valuable educational work is being done by various model and instructional farms, such as that at Bouaké.

Pigs. Pigs are reared in the south, where the Berkshire pig has been introduced and cross-bred with the indigenous types, but they are virtually unknown in the Moslem areas of the north.

Horses. Horses are a fairly recent importation, but are bred in considerable numbers in the sub-desert and the savanna, especially by the Fulani in Macina. They were formerly kept only for ceremonial and for war, and even now are seldom used either as pack or draught animals. Fig. 70 shows the limits within which they can be fed and safely kept.

Donkeys. Donkeys are rare in the coastal districts but are widely used as pack animals in the savanna, especially around Ouagadougou.

Camels. Camels are useful beasts of burden in the desert. They occur only in Mauritania, Niger, French Sudan, and northern Senegal.

Poultry. Poultry, of a lean and skinny type, abounds in West Africa and fowls may be seen around nearly every compound and in all markets. Native breeds are now being crossed with Buff Orpingtons, Rhode Island Reds, and Minorcas. Guinea-fowl and turkeys are fairly common.

Bees. Bees are common south of latitude 15° N., especially in the savanna, and play an important part in the native economy. In some communities honey is collected by the children, but many villages have a beeman who hangs up hollow tree sections in which the bees may nest. He fires the bush to stupify his victims and collects the honey and wax. As the 'wandering Jew' of the community, he is one of the principal carriers of infection during epidemics.

Movements of Livestock. The following table gives the movements of livestock within West Africa which were officially recorded in 1936, but many other movements must also have occurred, and re-exports are not included.

TABLE III

<i>Exporting colony</i>	<i>Destination</i>	<i>Cattle</i>	<i>Sheep and goats</i>	<i>Donkeys</i>	<i>Horses</i>
French Sudan	French Guinea	1,596	6,190	..	..
	Ivory Coast	3,611	1,675	..	..
	Dahomey	1,506	1,115	..	..
	Senegal	636	23,760	..	..
	Gold Coast	5,488	604	..	..
	Nigeria	2,947	6,005	..	..
Niger	Dahomey	9	1,003	131	..
	Nigeria	44,936	117,030	1,105	610
French Guinea	Sierra Leone	1,931	3,100	..	..
	Gold Coast	16,706	18,272	..	..

CHAPTER XI

COMMERCE AND FINANCE

COMMERCE

HISTORY

Trans-Saharan Trade (Fig. 71)

TRADE across the Sahara by routes running north and south is of considerable antiquity, although references to it in early classical literature are few. In the second century A.D., however, the Romans garrisoned some of the oases on the route from Tripoli to Lake Chad, probably reaching as far south as Bilma. Other routes do not appear to have been much used. About this time the camel was introduced into the Sahara from Asia and effected a minor revolution in desert transport. It is difficult to be specific about the articles of trade, but ivory and gold on the one hand and swords on the other were certainly among them.

From this time forward commerce across the Sahara was of real importance. Fluctuations occurred, but a considerable traffic was done until the early years of the present century. The principal routes were (a) Tripoli-Murzouk-Bilma-Lake Chad; (b) Tunis-Ghadames-Ghat-Kano; and (c) Constantine-Ouargla-In Salah-Timbuktu. Long strings of camels made their way in caravans from oasis to oasis, their clumsy gait giving them a speed of about $2\frac{1}{2}$ miles per hour. Their riders needed to be men of skill and determination, ready to combat not only the dangers of thirst, heat, and sand but also the assaults of marauding tribes. In either case the penalty of failure was death. On their southward journeys the camels bore the manufactured goods of North Africa and of Europe. Northwards they carried ivory, gold, copper, iron, cloth, and salt, while by their sides marched slaves. These last were unimportant before the eighth century; but for more than a thousand years Arab traders bought human beings from the chiefs of the Sudan for sale in the markets of the Barbary States.

Trans-Saharan trade has withered and died with the control of the whole of North and West Africa by European states. In former days the Sudan faced northwards, so to speak, for commercial purposes, but in modern times it has been connected to the gulf of Guinea and to the Atlantic Ocean by railway and by road. Tropical products now travel by sea, while the slave trade has been abolished.

Camel-borne trade is doomed; it is difficult to believe that a trans-Saharan road or railway can ever compete successfully with ships; and the future of desert routes seems to belong almost exclusively to the air.

The Coming of Europeans

From the late fifteenth century onwards European traders visited

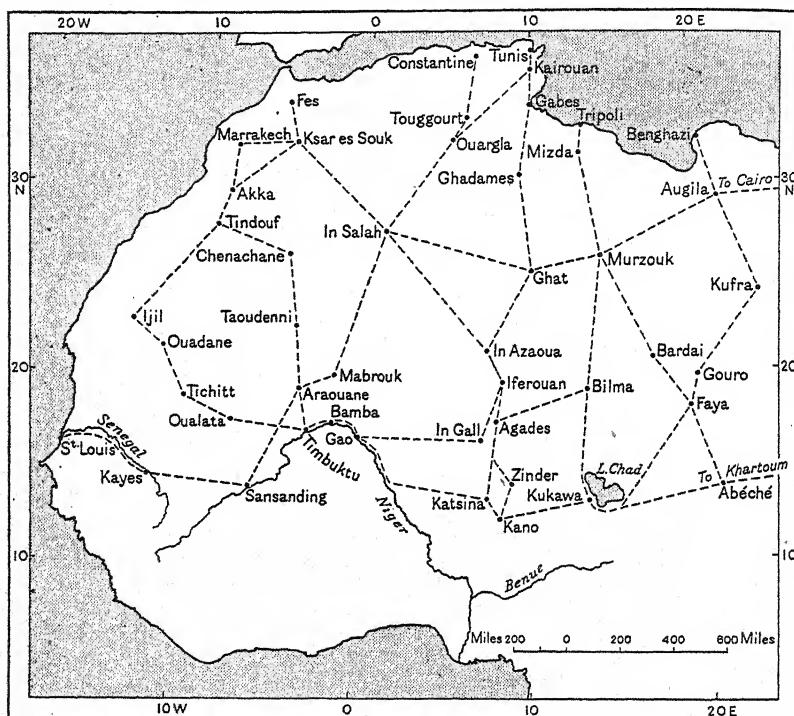


FIG. 71. *Trans-Saharan Caravan Routes*

the Guinea coast, and established factories, some ephemeral and some permanent. The old names for parts of the coast (see Fig. 46) suggest the principal items of trade: grain (spice), ivory, gold, and slaves. So far as English merchants were concerned, the seventeenth and eighteenth centuries saw the development of the Triangular Trade. Ships would sail from London or Bristol with cargoes of brightly patterned cloths and gew-gaws. These were used to purchase slaves, who were taken to be sold in the West Indies or in the other American colonies. The ships were then loaded with sugar, tobacco, and rum, and returned across the

Atlantic to their ports of origin, where their cargoes were sold. All three transactions showed handsome margins of profit to the fortunate ship-owners.

The Slave Trade. It must not be too readily assumed that the natives of West Africa were harmless and innocent peoples, cruelly set upon and enslaved by callous Europeans or Arabs. Numerous tribes kept slaves, some born in servitude and some prisoners of war. The coastal and border chiefs acted as middlemen to the slavers who came by land or sea, and slave markets were features of their towns. The cruelties of the slave trade have also been exaggerated, though the motive for any sort of kindness was the desire to maintain the good condition and good price of the human cattle. No accurate figures are available, but many hundreds of thousands of negroes were forcibly expatriated to the New World: to-day their descendants number millions. The suppression of the slave trade at sea was largely due to the work of the Royal Navy.

As the years went by, other commodities began to be exported. These included timber, coffee, cocoa, rubber, and ground-nuts.

THE FEDERATION TO-DAY

Comparison with Neighbouring Countries

Table I is extracted from S. H. Frankel, *Capital Investment in Africa* (Oxford, 1938). It gives total trade figures expressed as percentages of trade in Africa south of the Sahara, trade in which the Union of South Africa plays a predominant part. Table II, compiled

TABLE I
Trade in Africa south of the Sahara

		Percentages			
			1907	1928	1935
Anglo-Egyptian Sudan	.	.	1.76	3.48	3.12
Belgian Congo	.	.	2.85	4.79	4.33
British Colonies in East Africa	.	.	4.57	7.91	6.54
Cameroons	.	.	1.42	0.85	0.70
French Equatorial Africa	.	.	1.15	0.87	1.48
French West Africa	.	.	5.95	5.95	5.87
Gambia and Sierra Leone	.	.	1.75	1.56	1.12
Gold Coast	.	.	3.79	7.15	5.28
Nigeria	.	.	6.17	9.37	6.03
Northern and Southern Rhodesia	.	.	3.26	4.81	6.74
Portuguese Colonies	.	.	4.37	3.71	2.57
South-West Africa	.	.	1.46	1.76	1.24
Togo	.	.	0.54	0.41	0.29
Union of South Africa	.	.	60.96	47.38	54.69

from the same source, gives comparative figures of trade and investment for French, British, and Belgian colonies and mandates in West and Central Africa. These tables substantiate what is evident from many parts of this book, namely that French West Africa, although the most highly developed of the French possessions in tropical Africa, by no means equals the wealth or prosperity of Nigeria. Table I also shows that the relative positions of the countries concerned have changed very little during the period under review.

TABLE II
Trade and Invested Capital, 1935

	<i>Area in square miles</i>	<i>Population</i>	<i>Total trade in thousands of pounds</i>	<i>Invested capital in thousands of pounds</i>
Gambia	4,068	199,520	842	246
Gold Coast ¹	91,843	3,965,702	16,515	35,303
Nigeria	372,674	20,641,814	18,859	75,087
Sierra Leone	30,169	1,793,520	2,669	3,364
Totals	498,754	26,600,556	38,885	116,730 ²
French Equatorial Africa . .	867,700	3,423,015	4,622	21,260
French West Africa . .	1,822,855	14,944,830	18,378	30,426
Cameroons and French Togo .	183,173	3,390,199	3,107	18,624
Totals	2,873,728	21,758,044	26,107	70,310
Belgian Congo ³	940,540	14,132,843	13,540	143,337

¹ Including British Togo.

² Including £2,730,000 classified as 'sundry West African issues'.

³ Including Ruanda-Urundi.

Firms and Men

The principal firms in French West Africa are importers of general merchandise and exporters of African produce. Most of them are large French trading houses with head offices at Bordeaux, Marseilles, or, more rarely, Paris. The West African head offices are commonly at Dakar, with branches elsewhere. A few French firms have branches in British colonies and a few British in French. Managers are usually Europeans and are assisted by native clerks and storekeepers, but in the smaller towns stores staffed entirely by natives are by no means rare. A special feature in the commercial life of French West Africa is the presence of Syrian shopkeepers. Most of these, however, are not partners in large concerns but have small shops in native quarters.

The Balance of Trade

Official statistics are issued under two heads, *Commerce Spécial* and *Commerce Général*. The former omits and the latter includes re-exports, which are mainly ships' bunkering.

Since the Federation was first formed the value of imports has exceeded that of exports in all except three years, 1919, 1935, and 1936. Since Togo became mandated to France a similar state of affairs has existed there, the four exceptions being 1922, the first year for which statistics were published, 1924, 1934, and 1935. Table III gives a summary of these figures arranged in groups of years, and from this and from Fig. 72 it can be seen that the trade of this part of the French Colonial Empire has faithfully reflected contemporary world tendencies. The decline due to the economic crisis of 1931 deserves special mention, for the figures do not tell

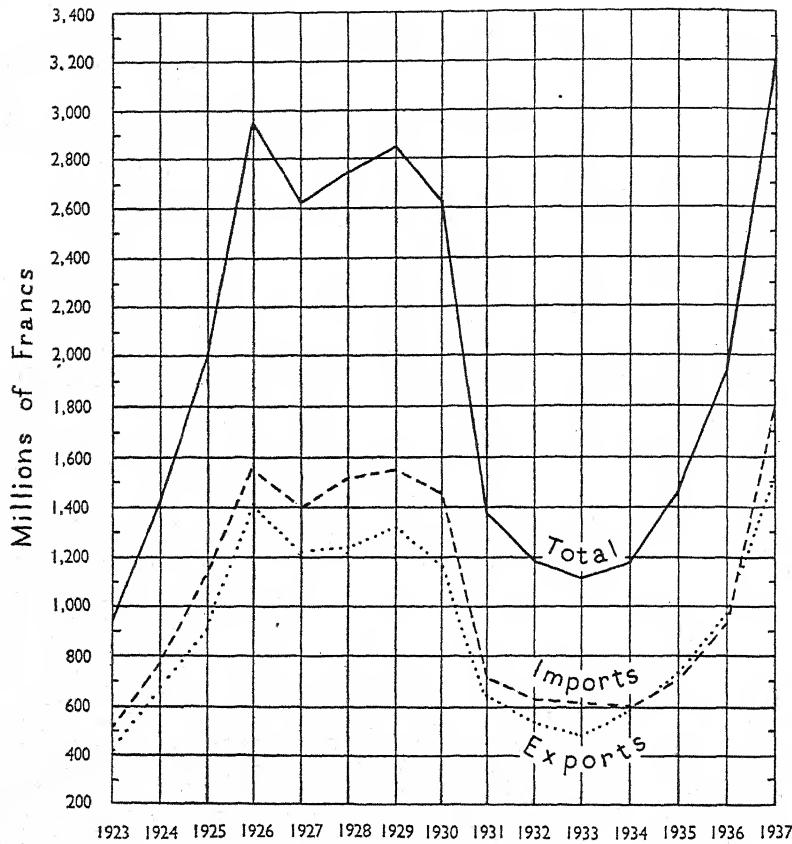
TABLE III

Mean Annual Value of Trade in Thousands of Francs

French West Africa			Period	Togo		
Imports	Exports	Totals		Imports	Exports	Totals
105,844	87,000	192,844	1906-10	..	..	..
135,617	110,055	254,672	1911-15	..	..	..
252,254	215,418	467,672	1916-20	..	..	..
627,361	523,727	1,151,088	1921-5 ¹	43,197	41,026	84,223
1,592,428	1,076,263	2,668,691	1926-30	100,636	80,172	180,808
662,334	597,357	1,259,691	1931-5	46,233	33,586	79,819

¹ 1922-5 for Togo.

the complete tale. Not only was there a marked shrinkage in the export and import totals as shown in French francs, but also there was a further shrinkage in real values which was masked by the fall in the value of the franc. In this connexion Fig. 73 must be consulted. On the additional assumption that the pre-1914 franc was worth 24 to the £ sterling, the value of the total trade of French West Africa in 1911 (263,043,315 francs) was £10,960,138, in 1929 (2,860,762,974 francs) £23,871,151, and in 1933 (1,137,475,000 francs) £13,756,564. Even these figures give a more favourable aspect than would the gold equivalents; e.g. in 1923 the franc was worth more than twice as much in gold as in 1935, although the sterling values were approximately the same.

FIG. 72. *The Trade of French West Africa*

Exports

As is to be expected, France takes the greater part of the exports of French West Africa, and Table IV gives some figures for *Commerce Spécial*. The position in Togo is not dissimilar. In 1935, out of a total of 34,690,000 francs, France purchased goods to the value of 20,400,000 francs, Germany to the value of 6,630,000 francs, the United States of America 1,990,000 francs, the United Kingdom 1,970,000 francs, and Holland 1,360,000 francs.

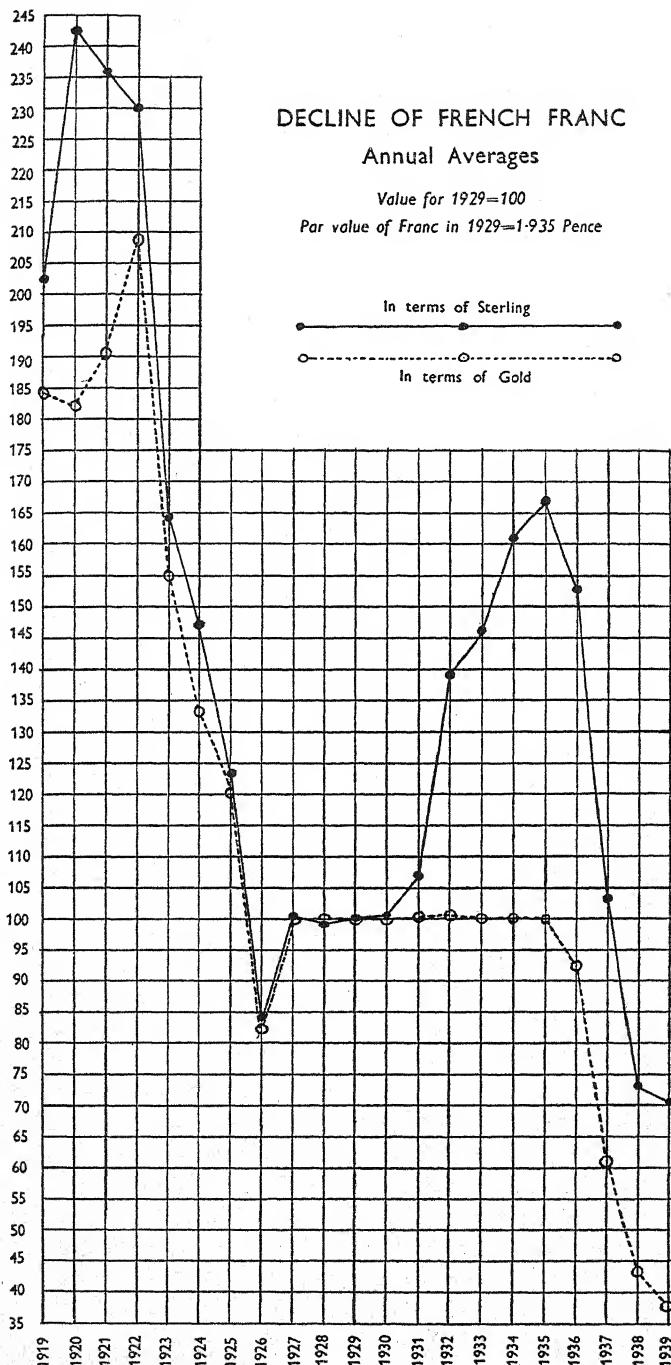


FIG. 73. *The Value of the Franc*

TABLE IV

Exports of French West Africa by Countries, 1933-1935

Destinations	Value in thousands of francs		
	1933	1934	1935
France	311,943	421,164	590,653
French Colonies and Protectorates	5,666	6,269	6,708
United Kingdom	18,966	17,065	4,495
British Colonies	17,148	14,462	28,284
U.S.A.	7,728	13,728	23,084
Holland	18,882	12,196	10,945
Germany	21,033	30,357	10,548
Belgium	16,669	4,317	5,069
Other countries	37,453	13,798	16,077
Totals	455,488	533,356	698,263

Table V gives a summary of exports by weight and value, while Appendix A gives details of the principal items.

TABLE V

Exports by Weight and Value, 1933-1935

	1933		1934		1935	
	Value in thousands of francs	Weight in tons	Value in thousands of francs	Weight in tons	Value in thousands of francs	Weight in tons
French West Africa . .	498,976	946,403	578,844	1,179,629	794,084	1,165,793
Togo . .	274	22,751	281	35,189	347	39,618
Totals . .	498,350	969,154	579,125	1,214,818	794,431	1,205,411

Ground-nuts. The principal product of French West Africa is ground-nuts (see Fig. 74), grown mainly in Senegal. The 1935 export total (see Appendix A) was made up as follows: ground-nuts in shell, 348,437 tons; shelled ground-nuts, 56,636. Of these 347,606 tons and 56,632 tons respectively were sent to France. The proportion of shelled nuts is growing, as a 25 per cent. saving on freights is obtainable by shipping the nuts shelled. It will be observed that the quantity of ground-nut oil exported was relatively small. In 1937, 520,308 tons of ground-nuts were exported, valued at 433,849,000 francs.

Other Vegetable Oils. For some years Germany was the principal buyer of palm kernels, with Holland second and France third; but by 1935 the leading purchasers were France, Germany, the United States of America, British Colonies, and Holland in that order.

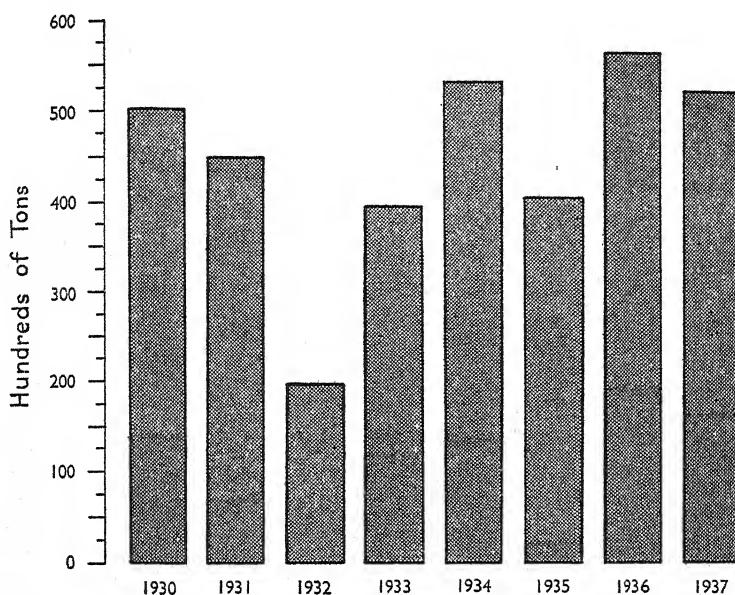


FIG. 74. *The Export of Ground-nuts*

Exports of palm oil were proportionately bigger than those of ground-nut oil, figures showing that the tonnage was about one-fifth of that of the palm kernels. In 1937, 80,214 tons of palm kernels to the value of 85,186,000 francs were exported, and 29,655 tons of palm oil to the value of 36,904,000 francs. For Togo the 1938 figures were 8,513 tons of kernels valued at 10,721,000 francs, together with 514 tons of palm oil. The shea-nut and its products, though of considerable importance in native economy, do not play a very large part in the export trade. Other small quantities of oil are expressed from the fruits of the castor plant and the coconut palm.

Bananas. Bananas are grown in French Guinea and the Ivory Coast and are exported to France. By 1937 the export had grown to 54,533 tons valued at 52,658,000 francs, and by 1938 to 64,087 tons.

Cocoa. Cocoa has been produced in considerable quantities in recent years, mainly in the Ivory Coast, although French West Africa cannot yet rival the Gold Coast. In 1937 the Federation exported 47,318 tons worth 149,143,000 francs, the principal customers being France and the United States of America.

Coffee. Exports of coffee have shown a sharp rise. In 1933 they consisted of 1,757 tons to the value of 8,846,000 francs, and in 1937 they were 10,260 tons to the value of 52,038,000 francs. Most of the coffee itself comes from the Ivory Coast, with a little from French Guinea.

Fibres. The principal fibre exported is normally sisal, the tonnage of which for 1933, 1934, and 1935 was 2,723, 4,107, and 4,601 respectively. The corresponding figures for cotton were 1,555, 2,390, and 2,898 tons. The beginnings of the Niger irrigation scheme have had their results, and the 1937 export of cotton was 3,855 tons valued at 17,543,000 francs. In 1938, 4,731 tons of cotton and 4,411 tons of sisal were exported, the latter being worth about 7,000,000 francs.

Livestock. Numbers of livestock, all sent to British West African colonies, showed an increase from 1933 to 1935, but their value declined. In 1936 the combined total for cattle, sheep, and goats was 258,120 head, and in 1937 317,000 head (see p. 330).

Gold. Gold, mined in French Guinea and French Sudan, is exported exclusively to France. Exports in 1937 totalled 10,701 lb. troy and were worth 119,771,000 francs.

Imports

France is the leading country importing into French West Africa, with the United Kingdom second and French Colonies and Protectorates third. Table VI gives some figures for *Commerce Spécial*, but the method of arranging the statistics should be borne in mind. They do not show the countries of origin, but only the countries whence the goods were consigned. It is said that considerable quantities of Japanese merchandise were shipped from Casablanca and even from London. In 1935 French Morocco was the principal country under the heading of 'French Colonies and Protectorates', supplying goods to the value of 14,437,000 francs.

The position of the United Kingdom deteriorated as a result of the introduction of a system of import quotas. In March 1934 restrictions were placed on the importation of cotton goods into those parts of French West Africa not covered by the Anglo-French Convention of 14 June 1898. This convention (see p. 209)

delimited the boundaries of British and French colonies south and west of the Niger and stipulated that for thirty years they should enjoy the same treatment in commercial and fiscal matters.

TABLE VI

Imports of French West Africa by Countries, 1933-1935

Sources of supply	Value in thousands of francs		
	1933	1934	1935
France	272,235	262,342	319,953
French Colonies and Protectorates . . .	46,447	38,671	74,435
United Kingdom	104,991	91,940	87,737
British Colonies	7,670	5,706	13,693
U.S.A.	26,297	30,322	40,294
Belgium	21,532	19,285	22,641
Japan	15,270	19,586	20,559
Germany	15,146	13,547	17,388
Holland and colonies	13,300	8,550	13,507
Czechoslovakia	7,044	5,869	6,637
Spain and colonies	14,125	7,515	5,361
Other countries	41,556	42,980	39,661
Totals	<u>585,613</u>	<u>546,313</u>	<u>661,866</u>

Notwithstanding, in November 1935 import restriction was extended to the Conventional Zone, i.e. Dahomey and the Ivory Coast, and quotas were fixed for a wide range of commodities, including cotton goods, motor-cars, tobacco, cement, iron and steel, glassware, faience, footwear, cutlery, tyres and other rubber goods, and perfumery. The British Government protested against

TABLE VII

Imports by Weight and Value, 1933-1935

	1933		1934		1935	
	Value in thousands of francs	Weight in tons	Value in thousands of francs	Weight in tons	Value in thousands of francs	Weight in tons
French West Africa . . .	639,399	596,577	607,335	687,153	720,115	832,670
Togo . . .	381	18,992	265	14,213	312	16,835
Totals . . .	639,780	615,569	607,600	701,366	720,427	849,505

this, and in January 1937 considerable modifications were made in the quota lists.

The United Kingdom is the leading importer into Togo. In 1935, out of total imports valued at 31,200,000 francs, the United Kingdom supplied goods worth 10,550,000 francs, France 3,510,000 francs, the United States of America 3,160,000 francs, Japan 2,170,000 francs, Germany 1,720,000 francs, and Holland 1,430,000 francs.

Table VII gives a summary of imports by weight and value, while Appendix B gives details of the principal items.

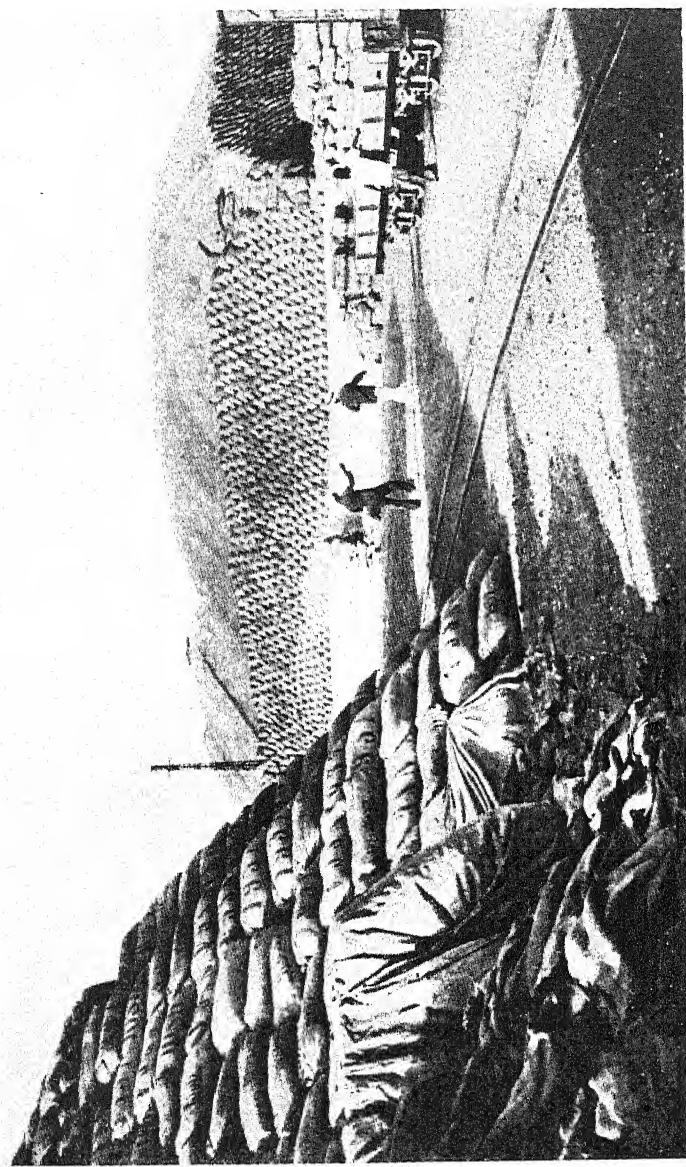
Cotton Goods. Cotton piece-goods are the biggest single class of import into French West Africa and also into Togo. They are the chief wearing apparel of most of the native races, and their importation affords some sort of an index to the general prosperity of the people. In 1935 ready-made clothing and underwear, chiefly from France, amounted to 403 tons valued at 10,100,000 francs. At one time the United Kingdom was the chief supplier of all types of cotton goods. The quota system mentioned above, however, dealt a severe blow to British cotton importers into the Non-Conventional Zone, though trade with Dahomey and the Ivory Coast was not affected at first. The beneficiaries under the scheme were not only France and Indo-China but also Japan.

Coal. French West Africa produces no coal of its own and consumption by domestic users is negligible. Coal needed for commerce and industry is imported by sea. Of the 117,129 tons imported in 1935 the United Kingdom supplied 74,433 tons valued at 9,400,000 francs, France 29,287 tons, Poland 7,480 tons, Holland 2,500 tons, Germany 1,754 tons, Belgium 1,673 tons, and other countries 2 tons. The above figures do not include bunker coal: at Dakar in 1935 this amounted to 66,784 tons, almost entirely supplied by the United Kingdom.

Oil. The consumption of petrol increased from 13,551 tons in 1933 to 17,507 tons in 1935, while that of the heavier fuel and lubricating oils also increased. At Dakar 373,824 tons of fuel oil were bunkered. Almost all these various oils came from the United States of America or from Venezuela.

Jute. British Colonies rank first in the official returns. This term must be assumed to include India, and in 1935 2,151 tons of jute tissues and sacks were supplied. France was second with 2,125 tons, and the United Kingdom third with 822 tons.

Rice. Rice is the most important item on the list of foodstuffs. The price fell considerably after 1931, and imported rice was consequently



84. Ground-nut dumps at Dakar



85. Head portage



86. Liane bridge at Makoma

cheaper than the home product. Of the 70,289 tons in 1935 French colonies (chiefly Indo-China) provided 65,523 tons and France 3,323 tons.

Iron and Steel Goods. Iron and steel bars, sheets, and wire totalled 9,108 tons in 1935 and were worth 9,798,000 francs. The leading suppliers were France, Belgium, and the United Kingdom with 4,278 tons, 3,202 tons, and 1,358 tons respectively. Agricultural machinery came chiefly from France (161 tons), the United Kingdom (51 tons), and Germany (22 tons). Electrical machinery and apparatus was mainly supplied from France. Of the 1,028 tons of other kinds of machinery 731 tons came from France, 109 tons from Germany, 88 tons from the United States of America, and 65 tons from the United Kingdom. The United Kingdom occupied first place among the importers of hollow-ware with 595 tons out of 2,156 tons, but the majority of motor vehicles came from the United States and from France. The former country, in spite of the high tariff on foreign cars, imported 899 vehicles to the value of 8,700,000 francs, while the latter imported 806 vehicles to the value of 12,100,000 francs. The same two countries naturally supply the bulk of the motor accessories. Bicycles to the number of 2,488 were imported from France, 2,173 from the United Kingdom, and 882 from Japan.

Tobacco. The United States of America supplied the bulk (1,042 tons) of the leaf tobacco in 1935. Cigars and cigarettes were imported from France and French colonies (226 tons), the United Kingdom (36 tons), and the United States (14 tons).

None of the other items of import is worthy of special mention.

From the facts given above it can be seen that the general state of the trade of French West Africa corresponds closely to that of most other tropical countries. Exports are mainly raw materials, the produce of field or forest, and imports mainly manufactured goods.

In addition, there is still a little purely native trade, whose figures cannot be tabulated. The old caravan routes are not entirely dead, goods are occasionally smuggled across international boundaries, pedlars ply their wares from colony to colony, and there is some minor exchange of goods between district and district. All is not controlled from Paris. Enough is left to recall the romance of the West African trade of the past; nor do the modern statistics altogether obscure the memory of the days when Arab slavers drove their victims under the hot sun, when tolls were paid to native kings, and when European merchants sailed their ships to half a hundred factories from Goree to Calabar.

FINANCE

REVENUE AND EXPENDITURE

Two initial difficulties hamper the inquirer into the finances of the French Colonial Empire. The first is that the method of presenting accounts seems designed to obscure rather than to clarify, and the second is that the Colonial Budget of France is intermixed with the sectional budgets of the individual possessions. In French West Africa the situation is still further complicated by the existence of the local colonial budgets. It is not easy to balance the grants made by France to the Federation against those made by the Federation, or to discover whether the colony is or is not a financial liability to its home country.

In 1937 the total expenditure by the Ministry of Colonies from French revenue was some 780,000,000 francs, in which was included the cost of the Ministry itself. Most of this was for military expenditure, which, until recently, was wholly charged on the funds of France; the colonies are now, however, expected to contribute, and French West Africa's share for that year was estimated at 7,700,000 francs.

In the Federation itself there are three types of budget, the General Budget, the Supplementary Budgets, and the Local or Colonial Budgets. The Supplementary Budgets are three in number, one each for the District of Dakar, for the Port of Dakar, and for Transport. Few details are published either of the revenue or of the expenditure, so that a close analysis of either is impossible. Furthermore, the estimates (*prévisions*) of the budgets do not bear a precise relationship to the exact sums of money raised or spent. For example, the combined budgets for 1935 balanced at 680,976,081 francs, but the actual revenue was 667,636,838 francs and the actual expenditure 597,985,965 francs. Table VIII gives a summary of the budget figures for 1933-1938. The 1939 General Budget balanced at 349,000,000 francs.

The General Budget bears the expenses of the public debt, of the Federal Government and its services, of the inspection of the various colonial services, of the maintenance of French Courts, of contributions to France, of public works, and of the collection of federal revenue. Its receipts include the earnings from undertakings managed by the Federal Government and from custom and excise duties.

These cannot be imposed by the individual colonies, and require the approval of the Ministry of Colonies. The only exceptions to this rule are the *octrois* of the communes. The Local Budgets take all revenues collected within their respective territories, with the excep-

TABLE VIII

French West African Budgets in Thousands of Francs, 1933-1938

	1933	1934	1935	1936	1937	1938
General Budget.	179,728	164,397	163,848	189,539	200,206	335,000
Supplementary Budgets	125,103	127,981	147,870	170,661	347,788	293,102
Local Budgets	408,833	399,431	369,258	368,608	399,589	498,162
Totals	713,664	691,809	680,976	728,808	947,583	1,126,264

tion of those appropriated by the General Budget, and pay for all services not specified above. Each of these budgets is drawn up by the Governor of the colony concerned and passed by his Executive Council. It is then submitted to the Governor-General and his Council, but it does not need the approval of the Minister of Colonies.

Revenue

The main items of the revenue of the General Budget of French West Africa as estimated for 1938 were as follows:

	Revenue, 1938	Francs
<i>Ordinary Revenue</i>		
Import and export duties	.	254,000,000
Other indirect taxes	.	12,335,000
Other imposts and duties	.	11,512,000
Workshops and factories	.	850,000
Radio-telegraphic services	.	1,783,000
Postal cheques and orders	.	225,000
Agricultural establishments	.	60,000
Receipts from previous financial year	.	235,000
<i>Public Funds</i>		
Receipts	.	700,000
<i>Extraordinary Revenue</i>		
Funds of co-operative and other special societies	.	2,110,270
Repayments of advances made by the Reserve Bank	.	600,000
Previous deductions for the Reserve Bank	.	<u>50,589,730</u>
Total	.	<u>335,000,000</u>

The largest single item was import and export duties, which accounted for more than two-thirds of the whole. Tariff assessments, rates of duties, and the procedure of collection are proclaimed by decree. In some cases specific duties are levied, in others *ad valorem*. Import duties are payable on a very wide range of goods, including textiles, oil, wine, motor-cars, sugar, tobacco, and matches. Export duties include those on ground-nuts, palm oil, skins, and livestock. The difference between the Conventional and the Non-Conventional Zones has been described above (p. 341). Direct taxation supplies only a small fraction of the revenue, and income tax was not introduced until 1 January 1933. It is difficult to see how such a tax could be collected except from Europeans or from Europeanized natives; for, as Chapter VII has pointed out, money plays a relatively small part in the economy of most of the inhabitants. The only direct tax payable by all natives is the head tax, the proceeds of which go to the colonies and not to the Federation.

Expenditure

The main items of the expenditure of the General Budget as estimated for 1938 were as follows:

<i>Expenditure, 1938</i>						
						<i>Francs</i>
<i>Ordinary Expenditure</i>						
Repayment of advances . . . . .	.	.	.	.	.	11,418,912
Interest on and amortization of loans . . . . .	.	.	.	.	.	66,956,501
Subsidiary loan charges . . . . .	.	.	.	.	.	2,916,712
Redemption of local debts . . . . .	.	.	.	.	.	3,300,245
Guarantee of colonial loans . . . . .	.	.	.	.	.	500,000
Intercolonial pension fund . . . . .	.	.	.	.	.	254,800
Other pensions and annuities . . . . .	.	.	.	.	.	336,000
Military expenses . . . . .	.	.	.	.	.	4,879,500
Mauritanian Police . . . . .	.	.	.	.	.	3,335,000
Grants to Local Budgets . . . . .	.	.	.	.	.	28,255,000
Grants to Native Provident Societies . . . . .	.	.	.	.	.	100,000
Other grants . . . . .	.	.	.	.	.	180,000
Payments for previous financial year . . . . .	.	.	.	.	.	148,830
<i>Salaries</i>						<i>Francs</i>
Governor-General . . . . .	.	.	.	.	.	480,000
Governor-General's staff . . . . .	.	.	.	.	.	3,472,000
Political and administrative officers . . . . .	.	.	.	.	.	14,387,000
Department of Finance . . . . .	.	.	.	.	.	21,939,000
Department of Economic Services . . . . .	.	.	.	.	.	5,372,000
Inspectortates-General . . . . .	.	.	.	.	.	4,444,000
Other salaries . . . . .	.	.	.	.	.	1,787,000
<i>Administrative expenses (other than salaries)</i>						<i>Francs</i>
Governor-General . . . . .	.	.	.	.	.	1,200,000
Political and administrative services . . . . .	.	.	.	.	.	2,500,000
						51,881,000

Expenditure (cont.)

Department of Finance	2,200,000
Department of Economic Services	3,469,000
Inspectorates-General	5,070,000
Other expenses	<u>2,235,500</u>
	16,674,500
Public works	54,620,000
Agricultural establishments	1,900,000
Other administrative charges	1,737,800
Secret service expenses	210,000
Sundry disbursements	30,595,200
Unforeseen expenses	100,000
<i>Public Funds</i>	
Expenses	700,000
<i>Extraordinary Expenditure</i>	
Additional public works	39,600,000
Other extraordinary expenditure	<u>13,700,000</u>
Total	<u>335,000,000</u>

By far the greatest charge on the revenue is the interest on and repayment of loans (*see below*). Otherwise there is little that calls for

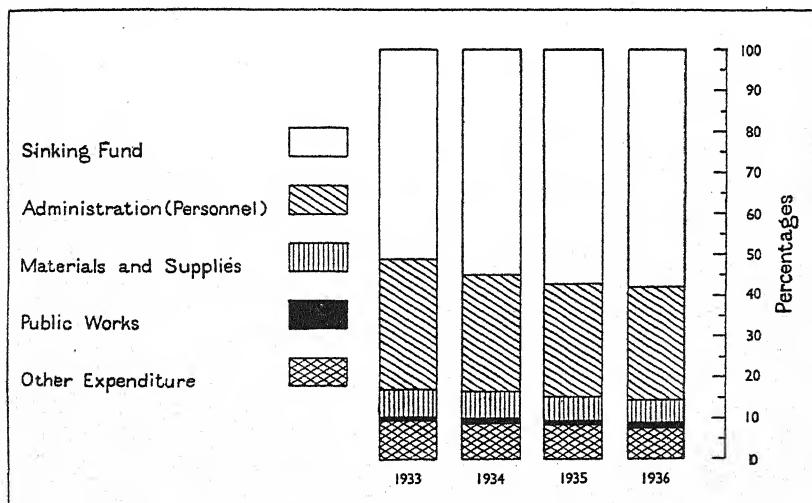


FIG. 75. *Expenditure of the General Budgets, 1933-1936*

comment, though it will be observed that colonial finances are assisted by the Federal Government. The apportionment of expenditure for some previous years is expressed diagrammatically in Fig. 75.

Loans

French West Africa has been developed by means of borrowed capital. During the first years of the Federation three loans were raised. In 1903 there was one of 65,000,000 francs, in 1907 one of 100,000,000 francs, and in 1910 one of 14,000,000 francs. All these were raised at 3 per cent., and a sinking fund was started for their repayment. In December 1913 authority was given for the raising of 167,000,000 francs, but, owing to the War of 1914-1918, this loan was floated in several parts. One was issued in 1913 for 25,000,000 francs at 3½ per cent., one in 1920 for 25,000,000 francs at 5½ per cent., one in 1922 for 50,000,000 francs at 5½ per cent., and one in 1924 for 50,000,000 francs at 6½ per cent. The rates of interest rose, and the remaining 17,000,000 francs were never taken up.

From 1903 to 1924, therefore, the funds raised by these loans amounted to the relatively modest total of 304,000,000 francs, of which 100,000,000 francs were raised during and after 1920. The apparent discrepancy of 25,000,000 francs is explained by the fact that some of the pre-1914 loans were never fully subscribed. It is interesting to note that, in the six years from 1923 to 1928, no less than 613,000,000 francs were forthcoming for public works and public services from the local resources of the Federation.

In 1931 authority was given to contract a loan of 1,570,000,000 francs as French West Africa's share of the Great French Colonial Loan, with an additional 120,000,000 francs for health measures. In 1932 the Federation's loan powers were further increased by 60,000,000 francs. The Law of 7 July 1936 brought the total to 1,837,000,000 francs apart from colonial loans. The relation at that date between the loans and their expenditure is set out in Appendix C.

It has been calculated that French West Africa accounts for 2·49 per cent. of all capital invested from abroad in Africa south of the Sahara.

Togo

The budget for Togo balanced at 28,753,000 francs in 1936, at 31,091,000 francs in 1937, at 40,996,700 francs in 1938, and at 50,534,000 francs in 1939. Details will be found in Volume II. Loans totalled 75,700,000 francs at the end of 1934.

BANKING AND CURRENCY

Banking

The principal financial institution is the Bank of West Africa

(Banque de l'Afrique Occidentale), which serves French West Africa, Togo, French Equatorial Africa, and the Cameroons. Its capital is 50,000,000 francs, its head office is at Paris, and its branches and agencies are at Dakar, St. Louis, Bamako, Kaolack, Conakry, Grand Bassam, Abidjan, Cotonou, Lome, Brazzaville, Port Gentil, Libreville, and Douala. Its general account for 1936 read as follows:

Assets

	<i>Francs</i>
Shareholders	11,200,000
Bank of France and Discount Bank of Paris	104,000,000
Guarantees for currency	283,100,000
Bills and acceptances	677,900,000
Loans to colonies	59,600,000
Current accounts and sundry debtors	25,200,000
Real estate	12,600,000
Sundries	13,900,000
	<u>1,187,500,000</u>

Liabilities

	<i>Francs</i>
Capital	50,000,000
Reserves	21,700,000
Provision for repayment of expired bills	55,000,000
Current bills payable to bearer.	730,000,000
Bills of exchange	45,100,000
Current accounts and sundry creditors	139,300,000
Colonial finance departments (current accounts)	61,500,000
Dividends payable	1,500,000
Customers' deposits	23,300,000
Mortgages	39,100,000
Re-discount of bills	3,200,000
Other creditors	16,100,000
Profit and loss	1,400,000
	<u>1,187,500,000</u>

The Banque Commerciale Africaine (capital: 12,000,000 francs), with its head office at Paris, has branches at Dakar, Kaolack, Grand Bassam, and Abidjan as well as other branches outside French West Africa. The Crédit Foncier de l'Ouest Africain has an agency at Dakar which advances funds on mortgage on house property. The Savings Bank (Caisse d'Épargne) was established by a decree of 22 July 1920, and began to function on 1 October 1922 with a single office at Dakar. On 1 January 1938 there were 151 offices with 32,459 depositors having 51,035,000 francs to their credit. The Bank of Agricultural Credit (*see p. 278*) makes loans to farmers.

There is no foreign bank in French West Africa other than a branch of the Banque Belge de l'Afrique at Dakar.

Currency

The only legal tender throughout the Federation and Togo is the

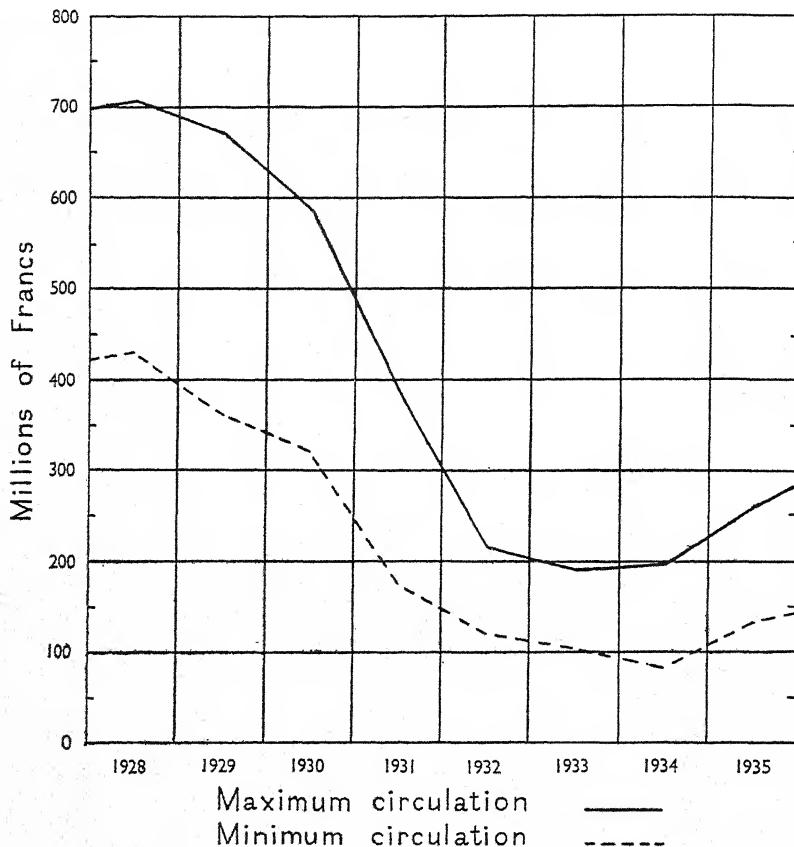


FIG. 76. *Fluctuations in the Issue of Bank-notes, 1928-1935*

franc. This is tied to the French franc, and the sole right of issue of bank-notes is enjoyed by the Bank of West Africa. There are no metal coins. A law of 18 January 1939 authorized the issue of notes to the nominal value of 1,400,000,000 francs, and on 28 February 1939 the actual fiduciary issue was 852,541,355 francs.

The statistics given in Fig. 76 show the fluctuations in the issue

of notes from 1928 to 1935 and afford some clue to the purchasing power of the population. The maximum circulation in each year is during the season of harvesting the major commercial crops, and the minimum corresponds to the season when the natives are mainly at work in the fields. October is usually the month of lowest circulation and January or February that of the highest.

APPENDIX A

Principal Exports of French West Africa, 1933-1935

	Quantities			Value in thousands of francs		
	1933	1934	1935	1933	1934	1935
<i>Vegetable oils</i>						
Ground-nuts (tons)	394,916	535,473	405,073	190,615	263,830	372,487
Palm kernels "	51,619	69,550	79,453	22,976	25,478	37,363
Shea kernels, oil, and butter	5,575	5,176	6,054	6,733	6,704	6,969
Ground-nut oil "	34	12	352	83	23	862
Palm oil "	11,868	16,051	26,086	7,115	6,934	18,972
Oilcake "	4,858	5,560	3,792	1,653	1,599	1,312
Castor-oil seed "	951	1,703	1,377	792	912	878
<i>Fruit</i>						
Bananas "	21,601	27,253	34,672	19,779	24,681	26,451
Orange essence "	102	142	207	795	1,033	1,714
<i>Timber</i>						
Mahogany "	25,558	28,187	25,544	10,631	13,173	11,358
Other timber "	15,745	15,016	19,961	3,635	3,777	5,100
<i>Other vegetable products</i>						
Cocoa (tons)	29,448	40,930	44,856	60,155	59,143	56,646
Coffee "	1,757	2,685	5,213	8,846	13,641	26,470
Cotton, kapok, and sisal	5,375	7,522	8,587	16,604	20,327	20,482
Gum arabic "	4,636	3,994	5,160	5,972	4,673	7,222
Rubber "	120	197	369	244	301	756
Maize "	..	..	1,514	..	..	522
<i>Livestock</i>						
Cattle (head)	82,907	95,878	97,081	15,195	12,829	10,466
Sheep "	205,770	194,233	210,550	3,310	2,797	2,382
Goats "	99,272	89,953	101,147	1,381	1,153	988
Donkeys "	8,162	8,000	8,119	615	461	445
Horses "	1,963	2,958	3,503	405	454	609
<i>Other exports</i>						
Gold (lb. troy)	6,273	8,933	11,491	26,400	36,763	48,275
Wax (tons)	376	477	568	1,965	2,110	2,646
Dried fish and prawns	1,805	1,149	1,039	4,345	2,558	2,578
Cow hides "	2,011	1,709	1,574	3,957	3,089	3,052
Sheepskins and goatskins	575	638	542	2,246	2,535	3,836
Honey "	1,579	963	542	1,442	690	268

APPENDIX B

Principal Imports into French West Africa, 1933-1935

		Quantities			Value in thousands of francs		
		1933	1934	1935	1933	1934	1935
<i>Textiles</i>							
Cotton goods and yarns	(tons)	8,713	8,760	10,384	160,122	141,081	175,729
Ready-made clothing	"	244	239	40	8,862	8,097	10,131
Woollen tissues	"	66	108	123	3,425	5,012	5,067
Silk tissues and linings	"	13	22	43	1,175	1,181	1,943
Artificial silk tissues	"	94	128	143	4,219	4,385	4,216
Jute tissues and sacks	"	3,358	5,259	5,652	10,955	14,787	15,201
<i>Foodstuffs</i>							
Rice	"	34,891	37,062	70,289	28,121	21,457	39,400
Flour	"	11,964	15,271	18,361	10,639	10,621	11,516
Sugar	"	9,673	9,941	14,997	12,757	12,530	18,696
Ships' biscuits	"	1,001	631	954	2,585	1,594	2,411
Meat, preserved and tinned	"	295	322	458	3,994	3,401	3,730
Milk, tinned	"	531	615	670	2,846	3,200	3,435
Potatoes	"	2,330	2,558	2,399	1,341	1,091	984
Other vegetables, fresh and preserved	"	3,276	3,489	3,461	6,050	5,907	5,597
Salt	"	17,892	18,248	17,919	4,063	2,962	2,639
<i>Building materials</i>							
Cement	"	38,500	41,240	53,662	8,857	8,005	8,588
Bricks and tiles	"	1,725	2,057	2,922	443	610	897
Other building materials	"	3,031	1,901	2,020	1,013	738	855
<i>Coal and oil</i>							
Coal	"	113,002	140,072	117,129	22,762	19,487	15,552
Petroleum and petrol	"	16,848	17,260	21,725	15,608	13,744	15,417
Fuel oil	"	2,059	2,745	4,130	703	653	807
Lubricating and other heavy oils	"	1,855	2,299	2,657	3,351	3,373	3,513
<i>Metal goods</i>							
Iron and steel bars, &c.	"	8,531	6,231	9,108	9,388	6,312	9,798
Agricultural machinery	"	402	304	256	3,401	2,434	2,095
Locomotives (Nos.)	(tons)	132	28	65	3,808	180	842
Electrical apparatus	(tons)	103	147	179	2,318	2,414	3,026
Other machinery	"	714	1,402	1,028	9,155	12,746	11,997
Tools and cutlery	"	544	873	929	3,364	4,521	5,365
Hollow-ware	"	2,617	2,592	2,156	8,993	9,027	9,388
Motor vehicles (Nos.)		642	1,153	1,736	9,981	15,194	21,143
Bicycles and parts	(tons)	65	120	151	1,230	1,587	2,269

APPENDIX B (*continued*)

	Quantities			Value in thousands of francs		
	1933	1934	1935	1933	1934	1935
Motor vehicle (tons)	208	327	364	4,497	5,217	5,484
accessories						
Other metal goods ,,	7,378	10,223	9,495	21,828	26,883	28,586
<i>Beverages</i>						
Wines, ordinary(galls.)	1,495,528	1,358,488	1,685,530	20,402	15,514	19,570
Wines, sparkling ,,	22,834	20,898	21,030	2,218	2,044	1,917
Wines, liqueur ,,	61,436	46,178	51,272	2,838	2,289	2,405
Liqueurs ,,	55,892	29,612	44,000	2,253	1,337	1,737
Spirits ,,	1,540	4,707	6,863	440	668	1,141
Rum ,,	7,985	5,893	7,171	901	582	686
Other distilled beverages	13,573	10,801	13,353	1,636	1,324	1,293
Beer ,,	256,122	248,378	359,832	3,413	3,516	4,776
Mineral waters ,,	14,140	13,966	13,368	1,478	1,341	1,605
<i>Other imports</i>						
Tobacco, cigars, (tons) and cigarettes	3,195	1,087	1,478	13,791	10,658	14,178
Timber ,,	5,627	4,579	7,459	5,273	4,240	5,667
Glass and earthenware	1,278	2,152	2,276	4,458	5,160	6,689
Paper ,,	1,994	2,083	2,264	8,706	7,877	8,728
Soap ,,	1,414	2,182	1,957	3,421	4,589	4,170
Fertilizers ,,	4,509	5,583	5,730	3,097	4,305	4,063
Matches (thousand boxes)	33,530	33,543	35,129	2,309	2,241	2,192

APPENDIX C
Loans and Expenditure

The following table gives the loans raised by the Government of French West Africa under the laws of 22 February 1931 and of 7 July 1936, together with the expenditure of the sum so raised. All figures are in francs.

	<i>Authorized amounts</i>	<i>Expenditure to the end of 1934</i>	<i>Probable expenditure in 1935</i>	<i>Estimated expenditure in 1936</i>	<i>Total expenditure</i>
General expenses . . . . .	..	3,172,320·15	1,322,900	1,555,900	6,049,320·15
Ports and rivers	447,000,000	136,335,945·01	30,335,000	34,246,000	200,716,845·01
Railways	628,000,000	158,956,898·81	28,342,000	26,739,000	214,937,898·81
Roads and bridges	83,000,000	8,502,706·05	4,455,000	5,720,000	18,677,706·05
Airways	10,000,000	2,813,935·38	3,035,000	4,231,000	10,679,935·38
Education	12,000,000	23,773·26	..	3,225,000	3,248,773·26
Military works and buildings	10,000,000	113,763·46	110,000	1,040,000	1,263,763·46
Niger irrigation scheme	300,000,000	73,187,465·88	25,000,000	19,855,000	118,037,465·88
Agriculture	227,000,000	1,283,575·50	8,812,000	18,973,000	28,168,575·50
Public Health.	120,000,000	39,719,709·72	10,938,000	12,730,000	63,387,709·72
Totals	1,837,000,000	424,110,093·22	112,749,000	127,409,000	664,2668,093·22

CHAPTER XII

COMMUNICATIONS

HISTORY shows that West Africa, since early in the Christian era, has seen the movements of many peoples and of great armies. Important empires have flourished and decayed. Trade and travel have been continuous. Neither the negroes nor the invaders from the north used wheeled transport, however. The former travelled afoot or by canoe; the latter, since the fourth century A.D., mostly by camel, though horses, donkeys, and cattle were also used. Before Europeans penetrated inland from the coast, roads did not exist.

It is not easy to remember to-day how very recent the penetration of West Africa is. Two quotations from Mr. E. W. Bovill's *Caravans of the Old Sahara* will serve to show the reason why.

'The slave trade largely accounted for the failure of Europeans to penetrate the interior from the coast of Guinea. Not only did it engender the bitterest hatred for the white man among the suffering tribes of the interior, but it so enriched the coastal chiefs that they offered determined opposition to any move which threatened their privileged positions as middlemen. When England eventually proceeded to abolish the trade the hostility of these wealthy coast chiefs was at once excited, greatly to the prejudice of her legitimate commercial interests.'

'Added to the hostility of the natives there were serious natural obstacles to any attempt by Europeans to explore the interior. Almost everywhere along the coast the dense forests of the tropical rain belt pressed hard upon the shore. Not only did the forest present a serious impediment to human movement but conditions of life within it were, before the discovery of the prophylactic use of quinine, highly inimical to the well-being of the European.'

For three centuries, therefore, European enterprise concentrated upon the seaboard. Ports and roadsteads, rivers as far as they served seaborne traffic, and roads between the trading stations, completed the tale. To this day the road and rail communications of the Guinea coast are concentrated mainly along the seaboard.

The earliest penetration of the interior naturally outflanked the north of the forest belt. Explorers went in from the Gambia or up the Senegal. The first hazardous crossings of the Sahara by Europeans were to come later. It was not until the eighties of last century that Frenchmen reached the Niger in any strength. They got there

by boat to Kayes, on the Senegal, and thence by foot to the Niger. The next step was to link the Senegal to the Niger by rail, and that connexion was not complete until early in this century. About this time a new factor appeared and began to shape the communications of West Africa as a whole. Hitherto the political partitioning of West Africa had prevented any general planning of roads and railways. But, by now, French North Africa was taking shape. French coastal colonies were rapidly connected inland of British and other coast territories, and, from all the French coasts, new railways were designed to reach the Niger, and so to meet trans-Saharan trade. The ultimate connexion of all these railways to one across the Sahara has long been discussed. From 1940 to 1942, however, sea routes were denied to the Central Powers, whilst reasons, both strategical and economic, made quick communication between the Mediterranean coast and West Africa a matter of urgency. In March 1941 an ambitious plan was put in hand. A railway was to run from Colomb Béchar in Algeria to Timbuktu and Koulikoro. Railhead on the Dakar-Koulikoro railway has not, however, advanced beyond the latter place, although some earthwork may have been done.

The financial effort required in developing railway communications has been heavy. On 1 January 1936 the former French railway budget was enlarged into the Budget for Transport (*Budget unique des Transports*). Estimates for 1938 totalled 222,277,000 francs (£1,364,890), a sum equal to about two-thirds of the General Budget. No less than 58,723,000 francs were spent on new works. Other published details are given in the table below.

Budget for Transport, 1938

Section	Enterprise	Receipts Francs	Expenditure Francs
I	Dakar-Niger railway	90,875,000	79,994,800
II	Railway from Conakry to the Niger	17,348,000	16,792,000
III	Railway from Abidjan to Bobo Dioulasso	38,890,000	32,304,024
IV	Network from Benin to the Niger	21,871,000	25,219,149
V	General funds (ordinary working)	973,100	15,647,127
VI	General funds (extraordinary working)	52,319,900	52,319,900
TOTALS	. . . . .	222,277,000	222,277,000

In spite of these important railway programmes, completed or in prospect, a serious rival has undoubtedly diverted some attention from them. Since the last war the internal-combustion engine has provided an easier solution for much of the traffic, and road construction has been active. In 1916 there were but sixteen motor

vehicles in French West Africa. There are more than ten thousand to-day.

Important as these roads and railways are, the great channel of trade between Koulikoro and Timbuktu, and indeed between Dakar and Zinder, is still the waterway of the Niger. Great improvements in its facilities, in the bypassing of its rapids, and in the river-craft which ply upon it, are in progress.

In meeting the growing volume of trade carried by these various ways Dakar has become the third port of greater France, whilst Conakry, Port Bouet, and other ports and roadsteads do a continually expanding business.

Signal communications are, though much extended, still very inadequate.

Airways had won an important place before the war. During the war their development has been enormous, but it is too early to be sure whether their present orientations will serve, usefully, the needs of peace.

So far nothing has been said of the communications of British West Africa; of such ports as Freetown, Takoradi, and Lagos, and of such railways as that from Lagos to Kano. Yet they carry a greater volume of trade than do their French neighbours, and it is impossible to get a proper understanding of West Africa generally without including a survey of them. Whilst French communications are the main theme of the following pages, British communications are also mentioned freely.

In describing communications as a whole, in this volume, the sequence Ports, Waterways, Railways, Roads, Airways, and Signals will be followed. More detailed descriptions will be found in the subsequent volume, which deals with individual French colonies.

The Communications map, in the end pocket, illustrates this chapter and should be constantly referred to.

POR TS

THE coast of West Africa is not rich in natural harbours. From the Draa, which is the northern boundary of Rio de Oro, to just south of Dakar the Canary current washes the coast from north to south. River mouths are turned southwards, and mainly closed by bars. Only at Villa Cisneros in Rio de Oro, Port Etienne in Mauritania, St. Louis and Dakar in Senegal, is there natural shelter. At all, a spit of land pointing south protects against prevailing winds, yet the first three are but roadsteads. Dakar is naturally well placed and well

protected, and harbour construction has added so much to nature that this port has become by far the most important in West Africa.

From the mouth of the Saloum (in Senegal) to Sherbro island (in Sierra Leone) there is no constant current, and the coast, generally fringed by mangrove swamps, is cut into by many arms of the sea. In these muddy estuaries are a series of ports mostly hampered by bars. In this stretch the ports of the greatest natural possibilities are Bathurst in the Gambia and Freetown in Sierra Leone; but Foudiougne, Fatik, and Kaolack on the Saloum, Ziguinchor and Sedhiou on the Casamance, Victoria and Boke on the Nunez, and Benty on the Mellacorée are all ports which do substantial trade. Conakry, also in this stretch, is more a natural harbour than an estuary port. Second only to Dakar among the ports of French West Africa, it stands on a long spit of ancient rock which juts out from the mangrove swamps, and the basin is sheltered by a newly constructed breakwater.

From the southern boundary of Sierra Leone to the eastern boundary of Nigeria the coast is washed, from west to east, by a strong current which, again, has smoothed outline and closed entrances by bars. Sea-borne sand has closed in a string of lagoons. No important river breaks through before the delta of the Niger is reached. Apart from the ports of the delta, in the Oil Rivers, the one natural harbour is that of Lagos. A modern artificial harbour has been made at Takoradi in the Gold Coast. Elsewhere ports are roadsteads, or more often unsheltered anchorages, from which cargo is transhipped into lighters and landed at wharves.

The more important roadsteads are: Port Etienne in Mauritania; St. Louis, Rufisque, M'Bour, Joal in Senegal; Tabou, Sassandra, Grand Lahou, Port Bouet, Grand Bassam, and Assinie in the Ivory Coast; Axim, Sekondi, and Accra in the Gold Coast; Lome and Anecho in Togo; and Grand Popo, Ouidah, and Cotonou in Dahomey. Of these St. Louis, Rufisque, Port Bouet, Grand Bassam, and Cotonou are worthy of further mention.

Many of the ports mentioned have a history of over three centuries, but as railways have developed from this or that harbour, and as the draught of shipping generally has increased, so has importance tended to concentrate on the favoured few. Naturally the importance of any one depends upon the trade it can tap, the communications by river, rail, or road for that trade, and, lastly, upon the amenities of the port itself. Those few ports which combine these factors with the greatest success are briefly described below. Tables A and B, also given below, show, for 1937, the tonnage which calls at

all the important French and British ports respectively, and the weight and value of their imports and exports. Descriptions and tables list ports from north to south, and then from west to east, as one sails past the coast of West Africa coming from Europe.

Detailed descriptions of all the ports of French West Africa will be found in Volume II. Short descriptions of the ports and roadsteads of Portuguese Guinea and of Liberia will be found in Appendixes I and II.

BRIEF DESCRIPTION OF THE MAIN PORTS

ST. LOUIS. Senegal. Lat. $16^{\circ} 01'$, long. $16^{\circ} 30'$ W. Population 33,066 (Eur. 1,000).

St. Louis is the outlet for the fertile area north and south of the river Senegal. It lies on an island in the estuary and has to be approached over a shifting bar, whilst the entrance to the river is silted up for weeks during the dry season. Goods are, however, brought several hundred miles down the river to St. Louis, whence they are transported by rail to Dakar (163 miles). There is a jetty at the harbour station on the mainland, and along the eastern side of the island there are two quays, 1,500 and 2,000 feet in length, north and south of Faidherbe bridge respectively. A first-class road to Dakar runs parallel to the railway.

DAKAR. Senegal. Lat. $14^{\circ} 39'$, long. $17^{\circ} 25'$ W. Population 92,634 (Eur. 6,508).

Dakar is the most important port of French West Africa and indeed of West Africa generally. Starting with great natural advantages it has been developed not only commercially but as a naval base, for which purpose its geographical position is well suited. It is the nearest point of Africa to South America, and nearly half of the way from Marseilles to Cape Town. It is, in fact, the third in importance of all French ports in whatever part of the world, surpassed only by Marseilles and Le Havre. The artificial harbour, begun in 1863, affords anchorage in $5\frac{1}{2}$ fathoms, and will take at one and the same time a considerable fleet of capital and smaller ships, as well as about forty sea-going merchantmen. It has facilities of every sort, including large stocks of coal and oil. There are two 125-ton floating cranes, but not many on the wharves.

Commercially Dakar is the main outlet for French Sudan, the north of the Ivory Coast, and the whole of Senegal. About three times

as much shipping deals there as touches at Freetown (the next port of importance in West Africa).

Air, rail, and road communications serve the port well.

RUFISQUE. Senegal. Lat. $14^{\circ} 41'$, long. $17^{\circ} 12'$ W. Population 16,600 (Eur. 180).

Rufisque is a roadstead lying north of the bend of Goree bay, on the road and railway converging on Dakar ($18\frac{1}{2}$ miles). It is an important commercial centre with a trade in ground-nuts. A Decauville track leads from the station to its several wharves.

KAOLACK. Senegal. Lat. $14^{\circ} 07'$, long. $16^{\circ} 07'$ W. Population 40,000 (Eur. 1,000).

Kaolack lies on the Saloum river, about 75 miles above the entrance, and is accessible to vessels of 12-13-foot draught according to the season. It has the largest export trade in ground-nuts of any port in Senegal. A branch of the Dakar-Niger railway leads to the town, and lines run from here to the river front, where there are extensive quays. Kaolack is the capital of Sine-Saloum province and the centre of a network of roads.

BATHURST. Gambia. Lat. $13^{\circ} 28'$, long. $16^{\circ} 37'$ W. Population 9,435.

Bathurst is the sole port of the Gambia. It is built on the southwest side of the entrance to the Gambia river, where the estuary is about $2\frac{1}{2}$ miles wide. Depth is 10-14 fathoms $2\frac{1}{2}$ -5 cables from Government pier and 13 feet alongside the pier.

Imports are cotton and metal goods, tobacco, and timber. Exports are mainly ground-nuts, palm kernels, and hides.

ZIGUINCHOR. Senegal. Lat. $12^{\circ} 32'$, long. $16^{\circ} 21'$ W. Population 7,977.

Ziguinchor is 40 miles up the Casamance river and accessible to vessels of 15-foot draught. Ground-nuts and fruit are the chief exports. Quays cover a total length of 3,000 feet and there is ample warehouse accommodation.

CONAKRY. French Guinea. Lat. $9^{\circ} 29'$, long. $13^{\circ} 44'$ W. Population 14,000 (Eur. 1,200).

Conakry stands at the point of a spur of rocky country which pushes 20 miles south-westwards through mangrove swamps to the open sea. It is sheltered by a breakwater, about 1,200 yards long, which lies parallel to the port and about 1,000 yards off shore. Another break-

water, north of that existing, is to be built in the future. Inside the breakwater the depth is from 3 to 5 fathoms, whilst alongside a 300-yard length of quay there are $4\frac{1}{2}$ fathoms. Conakry is an important and growing port, second only to Dakar, and is the outlet for French Guinea, whose railway runs to Kouroussa on the Niger, and to Kankan on the Milo. Bananas are the chief export, and special warehouses and cold-storage ships have been built for this trade. The only direct communication with the interior is north-eastwards by rail or road, across Fouta Jalon. North and south of Conakry the mangrove swamps are impenetrable for a depth of several miles from the coast.

FREETOWN. Sierra Leone. Lat. $8^{\circ} 29'$, long. $13^{\circ} 16'$ W. Population 44,142.

Freetown stands on the south side of the estuary of the Sierra Leone river and just below the northern end of the mountain range from which the colony takes its name. Depth in the approach channel is 6 fathoms, and 8-20 fathoms in the main anchorage, 7 cables from Government wharf. Owing to the proximity of the hill-side to the port, storage space is limited. Facilities are poorer than its admirable natural advantages seem to warrant, and there is no deep-water quay. Further up the estuary there is a quay, 36 feet alongside, at Pepel, which is the terminus of the Sierra Leone Development Company's railway, and from which iron ore is exported. At Freetown the articles imported are textiles, metal goods, tobacco, wines, timber, and oils. The chief exports are gold, diamonds, iron ore, palm kernels, and ginger. Freetown handles about 90 per cent. of the trade of Sierra Leone, the other 10 per cent. being divided between Bonthe and Sulima.

Rail and road communications lead round the mountain to Waterloo, and from there fork to serve the interior provinces.

PORT BOUET. Ivory Coast. Lat. $5^{\circ} 15'$, long. $3^{\circ} 56'$ W. Population 6,143 (Eur. 1,478).

Port Bouet is the main outlet of the Ivory Coast and is the port of Abidjan, which stands on the north shore of Ebrié lagoon. Anchorage is in 16 fathoms about a mile off shore. The wharf has eleven cranes of about 3 tons capacity each, and railway sidings, and there is a good road and rail connexion with Abidjan, also a road leading to Grand Bassam, 13 miles east. About 4 miles west of Port Bouet a canal is being cut, as part of a plan to develop Abidjan on a large scale and to

give it direct access to the sea. Port Bouet has a future. The sea-front on which it stands has a depth of about 3 fathoms; the canal should be finished two or three years after the war, and port facilities are well designed.

GRAND BASSAM. Ivory Coast. Lat. $5^{\circ} 11'$, long. $3^{\circ} 48'$ W. Population 5,900.

Grand Bassam was the first trading settlement established on the Ivory Coast and it was the first capital of the colony (1893-1900). During the last ten years its importance has, however, declined, owing to the development of Abidjan and Port Bouet. Anchorage is 2-4 cables off shore, but frequently lighters cannot be used because of the heavy surf. There is an important trade in palm oil, but there are no rail facilities. Grand Bassam is the only port in the Ivory Coast with cable communication.

TAKORADI. Gold Coast. Lat. $4^{\circ} 51'$, long. $1^{\circ} 49'$ W. Population 6,000.

Takoradi affords the only sheltered harbour, between Freetown and Lagos, for ships of over 30-foot draught. It was opened in 1928 and is enclosed by two 'overlapping' breakwaters, leaving an entrance one cable wide. There is a roadstead anchorage off the lee breakwater in 30 feet, and inside the harbour the depth is 24-37 feet. There are very good facilities, including ample storage space and a pipe-line, but repairs to ocean-going vessels cannot yet be undertaken.

Imports include cotton goods, bags and sacks, tobacco, petrol, oils, coal, machinery, wines, and provisions. Exports are cocoa, manganese, gold, mahogany, bananas, palm kernels, and rubber.

Railway sidings are actually on the wharves, and good rail and road communications connect to the Tarkwa and other mines, to Kumasi, and to Accra.

ACCRA. Gold Coast. Lat. $5^{\circ} 31'$, long. $0^{\circ} 13'$ W. Population 21,000.

Accra, the capital of the Gold Coast, has a roadstead in which there is anchorage in $4\frac{1}{2}$ -6 fathoms off shore. There is a small harbour formed by a breakwater $2\frac{3}{4}$ cables long, but the depth alongside the lighter wharf, inside the breakwater, is only 6 feet at low water. Goods are landed by lighters or surf boats, the latter transporting 400-500 tons daily. Imports are cotton goods, hardware, provisions, tobacco, and spirits; cocoa, palm oil, palm kernels, hides, and rubber are exported.

COTONOU. Dahomey. Lat. $6^{\circ} 21'$, long. $2^{\circ} 28'$ E. Population 8,100.

Cotonou is the port of Dahomey and is linked to Porto Novo, the capital, by road and railway. Cotonou is also the terminus of the Central Dahomeyan railway which runs north-west to Parakou (270 miles), with two branches. It has an airfield and cable and wireless stations. Porto Novo is on the north of Nokoué lagoon, and it is estimated that half the export trade of Dahomey crosses the lagoon from here to Cotonou, the remainder going, by lagoon, to Lagos. Cotonou has a wharf with 11 cranes, of from 2 to 15 tons capacity.

LAGOS. Nigeria. Lat. $6^{\circ} 26'$ N., long. $3^{\circ} 28'$ E. Population 127,408 (Eur. 1,300).

Lagos is the capital of Nigeria and also handles most of its imports and exports. The value of the West African trade at this port is considerably greater than that of Freetown (in Sierra Leone), in spite of the fact that it serves less shipping. It is the best-equipped British port in West Africa. Lagos itself lies on an island at the south-west end of Lagos lagoon. Just opposite it, about 500 yards to the north-west, is the island of Iddo, which is connected to Lagos by road bridge and to the mainland by both rail and road. Apapa, also on the railway, is a mainland suburb of Lagos and lies half a mile to the west. The passage between Lagos and Apapa forms the harbour, with wharves and warehouses on both sides. Vessels of 27-foot draught can cross the bar and the entrance to the harbour is 3 cables wide, between two moles. There is a large floating dock and a government slipway. Exports include palm kernels, palm oil, cocoa, bananas, tin, ground-nuts, cotton lint, hides, mahogany, rubber, and gum. Imports are fish, salt, chemicals, hardware, machinery, tobacco, bags and sacks, matches, boots and shoes, cotton goods, fuel oil, kerosene, and petrol.

The Elder Dempster Line provides the majority of ships calling, but the port is also served by John Holt & Co. (Liverpool) and by American, Swedish, Dutch, French, Italian, German, and Japanese lines.

BURUTU. Nigeria. Lat. $5^{\circ} 21'$, long. $5^{\circ} 30'$ E. Population 6,429 (1929).

Burutu lies about 4 miles above Forcados on the river of that name, and is accessible to vessels of 15-foot draught. It is the headquarters of the Niger Co., which runs a large fleet of river-craft as far as Jebba

(532 miles) on the Niger and to the Cameroons border on the Benue. There are several concrete wharves and a large patent slip. Imports include cotton goods, salt, tobacco, hardware, machinery, kerosene, and building materials. The chief exports are palm oil, palm kernels, ground-nuts, cotton, tin, hides, and rubber.

PORt HARCOURT. Nigeria. Lat. $4^{\circ} 45'$, long. $7^{\circ} 07'$ E. Population 15,000 (1928).

Port Harcourt is a coal port 27 miles above Bonny on the Bonny river, and about 40 miles from the sea. It is approached by a channel 21-60 feet deep and is the terminus of the Eastern Railway from which coal from the Udi coalfields, 150 miles due north, is shipped. It has several wharves and a small floating dock.

Trade of French West Africa through British Ports

The ports of Nigeria offer striking proof of the dependence of trade upon communications and port facilities, for they do a considerable transit business with surrounding French territories. The following table gives figures of that transit trade for 1937.

	1937
	£
Through Lagos to Porto Novo	2,330
" , to French territory by railway	216,216
" Port Harcourt to French territory by railway	794
" Burutu to French territory by the Niger	47,179
" Warri to French territory	2,139
Total import transit trade	<u>£268,658</u>
Through Lagos from Porto Novo	235,423
" Burutu from French territory	115,393
" Calabar , ,	236
" Tiko , ,	29,692
Total export transit trade	<u>£380,744</u>
Grand total	<u>£649,402</u>

TABLE A
French Ports, 1937

Ports	Ships entered		Imports		Exports	
	Number	Registered tonnage	Tonnage in thousands of tons	Value in thousands of francs	Tonnage in thousands of tons	Value in thousands of francs
Port Etienne . .	62	103,392	0·9	2·1	0·5	2·3
St. Louis . .	125	22,435	30·4	31·6	8·3	11·9
Dakar . .	3,719	7,831,922	1,298·7	763·2	1,284·3	572·3
Rufisque . .	256	144,945	13·6	11·3	50·5	45·0
M'Bour . .	176	4,019	3·1	6·7	27·2	23·7
Joal . .	297	8,453	1·0	2·1	3·6	2·7
Foundiougne . .	404	35,115	17·3	32·2	97·1	79·8
Kaoslack . .	453	44,755	124·6	142·8	247·7	224·3
Ziguinchor . .	106	38,049	13·9	29·0	61·9	67·2
Victoria and Boke . .	220	7,350	1·7	6·2	4·2	6·4
Conakry . .	2,302	1,346,022	86·9	193·3	84·4	171·7
Benty . .	165	45,317	2·0	3·0	1·6	2·2
Tabou . .	295	868,294	1·0	1·5	1·7	1·1
Sassandra . .	230	820,938	7·6	10·8	17·7	29·0
Grand Lahou . .	128	376,653	2·2	3·6	19·0	13·3
Port Bouet . .	558	1,741,191	81·5	209·7	119·1	213·7
Grand Bassam . .	328	965,085	27·6	66·4	51·7	60·6
Assinie . .	94	270,536	1·9	3·3	10·7	11·3
Grand Popo . .	52	145,661	0·8	0·4	9·7	12·7
Ouidah . .	9	24,844	No information		2·6	3·9
Cotonou . .	442	1,475,263	44·7	107·1	87·1	104·5

TABLE B
British Ports, 1937

Port	Ships entered		Imports		Exports		Revenue
	Number	Registered tonnage	Tonnage	Value	Tonnage	Value	
Bathurst . .	263	652,746	..	£ 801,716	..	£ 710,060	£ ..
Freetown . .	872	2,665,606	..	£ 1,257,168	..	£ 1,892,868	..
Takoradi . .	776	..	301,599	..	682,384	..	£ 1,300,003
Accra . .	614	..	207,835	..	112,798	..	£ 1,464,721
Lagos . .	633	1,589,618	352,408	£ 12,994,624	588,454	£ 9,565,656	..
Port Harcourt . .	60	78,581	78,856	2,362,747	156,695	3,865,638	..
Burutu . .	..	..	76,181	995,635	111,380	1,389,762	..

WATERWAYS

A glance at Fig. 6 will show how numerous are the waterways of West Africa. On most of them canoes are active, sometimes throughout the year, sometimes only just after the rains. As is usual in Africa, however, they are all 'young' in the geographical sense, and have not had time to wear down their beds to a well-graded fall. Moreover, where rainfall is seasonal the majority shrink so much in the dry season that navigation becomes increasingly formidable. There are indeed few rivers which offer facility for steamers or motor-boats except along short and divided reaches. From the north of Mauritania to the Senegal at St. Louis there are no rivers of transport value. From Dakar to Sherbro island, where winds and coastal currents are variable, rivers are relatively short and of small value. The coast is, however, cut by many estuaries used by trade and connected by channels or by those *marigots* which take in, or give out, water according to the flow in the rivers. Some of the more important of these estuaries will be mentioned.

From Monrovia to the Niger the coast is swept by the easterly current, and the rivers, difficult of access, support little traffic other than canoe. There are, however, valuable waterways in the lagoons which often link coastal towns.

The inland waterways of real importance are the Niger and the Benue.

The order of description will be from the north-west (the Senegal), southwards, and then eastwards to the Niger delta. All of these waterways will be described in more detail in Volume II.

The *Senegal* begins as the Bafing river and rises in Fouta Jalon. Its head-waters are swift and unnavigable. Indeed, falls and rapids are common as far as Bakel, although, in flood water, the river is navigable up to Kayes (about 555 miles up stream). Below Bakel the Senegal divides into two main streams which unite again at Podor. Below Richard Toll the country is flat, there is little fall, and the river floods vast areas. On either side of the main stream marshes and lakes (*marigots*) receive the overflow, and return it as the river falls. Finally, on reaching the coast, the mouth is diverted south by a long sandy spur washed southwards by the Canary current. The mouth is obstructed by a bar often washed by seas heavy enough to stop all traffic.

The wet season begins, near the source, in April and May; near the mouth in July and August. Accordingly the deepest water,

which comes some time after the rains, is about 20 August at Kayes, 1 September at Matam, 5 October at Podor, and 20 October at St. Louis. From 20 August to 20 September ships up to 1,000 tons burden and drawing less than 15 feet can ascend as far as Kayes, whilst ships of 10-foot draught can get there from 1 August to 15 October, and launches of 6-foot draught from 14 July to 10 November. In 1929 more than 16,000 tons were loaded or unloaded at Kayes. It was from Kayes, as the end of water-borne traffic on the Senegal, that the railway connexion to the Niger originally started. In the dry season Podor is the limit of steamer navigation, and even so the draught must be less than 10 feet. The Messageries Africaines run fortnightly services to Podor, and other fortnightly sailings in the wet season direct to Kayes (August and September) and from Podor to Matam (July to January). There is a great deal of barge traffic.

The *Saloum* is only the estuary, 80 miles long, of a small river, now practically dried up. The entrance is obstructed by shifting sand-banks, but within the bar the river deepens and vessels of 12-foot draught in the dry season, and 13 feet in the rainy season, can reach Kaolack about 65 miles from the coast.

The *Gambia* is navigable at low water for vessels drawing less than $5\frac{1}{2}$ feet as far as Basse, 210 miles from Bathurst, and to Kuntaur, 150 miles, for a draught of 19 feet. For six months high-water depths are doubled. The entrance channel to the river is long and winding.

The *Casamance* has a very wide mouth and a drainage area of about 6,000 square miles. The mouth is 6 miles wide, and 6-7 feet of water cover its bar at low tide. At other times it may be navigable by vessels of 15-foot maximum draught. The estuary, with its lateral channels, extends up to the confluence of the Songrougou river 65 miles from the sea. For 60 miles from its mouth the Casamance is navigable for light-draught vessels. At Sedhiou, 80 miles from the sea, it is $1\frac{1}{2}$ miles wide, and its total length is 212 miles.

The *Cacheo* (Portuguese Guinea) has the long estuary characteristic of this part of the coast. The entrance is long and winding, and ships drawing 15 feet are safe in it. The river will take vessels of 12-foot draught 100 miles from the entrance.

The *Geba* (Portuguese Guinea) has a very wide estuary approached by channels both north and south of the Bissagos islands. Ships drawing 36 feet can reach Bissau and Jabada, the ports north and south of the entrance, and small boats (under 5 ft. draught) can penetrate another 70 miles. The river Corubal (or Rio Grande) joins the Geba estuary, but is of little value as a waterway.

The waterways of coastal French Guinea are the Nunez, Pongo, Konkoure, and Mellacorée. All end as arms of the sea and are navigable by light craft for distances which vary from 43 miles (Nunez) to 15 (Pongo). The head-waters of the Niger, also navigable, will be dealt with later.

The Great, and Little, Scarcies are rivers of northern Sierra Leone. The former is, in its upper reaches, the boundary with French Guinea. Both are navigable for small craft for part of their course, but neither is of importance.

The entrance to the Sierra Leone river is noteworthy because of Freetown harbour to which it leads. Vessels of 26-foot draught can ascend to Pepel point, 15 miles beyond Freetown. The many streams which converge upon the estuary are of little value as waterways.

Behind Sherbro island is a much frequented arm of the sea, with a good landing-beach at York settlement. Small craft and launches are active on the minor rivers which drain the southern province of Sierra Leone.

The rivers of Liberia, most of them between two and three hundred miles in length, are of no present traffic value. The coast is not broken by estuaries, as it is farther north, and river mouths are fringed with bars, whilst, as yet, no attempt has been made to improve and exploit water communications.

Along the Ivory Coast bars are dangerous and rivers of no great transport value. The Cavally is navigable for some 50 miles by small craft; the Sassandra for about the same distance, the Bandama for a little farther, and the Comoé and Bia for less. On all these rivers rapids are dangerous, and even canoe traffic is small when the rivers are low.

On the other hand, a valuable water route is the string of lagoons which lie just within the sandy coastline between Fresco and the Gold Coast frontier. Regular steam-launch services ply on these lagoons, and most are already connected by canal.

In western Gold Coast the only waterway of significance is the Ankobra. Launches and heavy surf boats can ascend 60 miles when the river is high, 45 when low. There is but 6 feet of water over the bar.

The *Volta*, in eastern Gold Coast, is a biggish river and comes next in rank as a waterway after the Niger, the Benue, and the Senegal. At the same time, rapids and the bar prevent navigation for anything drawing over 9 feet. Heavy cargo canoes can go 400 miles inland, on the main (Black) Volta, or on its tributaries the White Volta and the

Oti, but launches can get no farther than Kete Krachi, and that only when the river is full, for there are rapids below that point. The river is full in August, and lowest in January and February.

Togo and Dahomey have few rivers of importance. The Mono (Togo) is navigable for canoes up to 60 miles from its mouth, and the Ouémé (Dahomey) for 100, but neither will take heavier craft.

The lagoons of south-east Dahomey carry much traffic, including regular services between Cotonou and Porto Novo. A connexion between Porto Novo and Lagos Harbour exists, and from Lagos other lagoons continue the chain as far as Port Harcourt. A regular service connects Port Harcourt and Lagos.

To the east of the Bight of Benin the coast turns southwards to the Oil Rivers—the mouths of the Forcados (15 ft. bar), Nun (15 ft.), Brass (15 ft.), Bonny (23 ft.), and Opobo (13 ft.) rivers. All these are but arms of the Niger delta, which covers 120 miles of coastline, and extends 150 miles inland. Practically every place in the delta region can be reached by water. As an inland waterway the Niger will be described later.

Farther east along the coast the Cross River enters a large estuary which stands Calabar. There is 6 feet of water for about 150 miles inland and there is always a lively traffic on it.

Before turning back to the Niger mention must be made of the Benue, which joins the Niger at Lokoja. The Benue is that very rare river of Africa—one without rapids—but water falls very low from November to May. From July to October it carries much traffic.

The Niger

Nearly 100 miles from its source in the Guinea Highlands the Niger reaches Kouroussa, a station on the Conakry-Kankan railway, and becomes a valuable waterway. In April and May water is too low for navigation. In May it begins to rise and barges or lighters begin to ply. By August the river has risen 20 feet. Steamers run from Kouroussa to Bamako (235 miles) for about half the year, whilst for four or five months barges or lighters are sailed, or poled, at a rate of about 25 miles a day. Canoes pass at all seasons. Traffic on this stretch comes under an inland waterway administration, which has 4 steamers and 21 lighters (1929), and which deals with over 1,000 passengers and 15,000 tons of cargo in the year. The route from Bamako to Conakry takes a considerable percentage of the trade of French Sudan.

The upper Niger, from Bamako to Koulikoro, is obstructed by

rapids. It is here that the Barrage des Aigrettes has been built and the Sotuba canal links the head-waters to the next naturally suitable waterway, from Koulikoro to Ansongo (880 miles). This stretch is also under an inland waterway administration which has 7 steamers, 3 tugs, and more than 50 lighters in action. Passenger traffic reaches 10,000 to 12,000 a year, and cargo about 30,000 tons. Most of this traffic is between Timbuktu and railhead at Koulikoro. Here again, however, steamer traffic lasts for six months only (mid-July to mid-December) and takes four days each way. Private transport firms, European and native, augment official services and include such bodies as the Société de Bamako and the Messageries Africaines, both of which have lighters and tugs.

Below Timbuktu the Niger narrows, and below Ansongo it is broken by rapids. Nevertheless, it is navigable at high water (from December to June), and the lack of water-borne traffic is due to its direction—transverse to the main lines of French communications—and to the paucity of trade between Niger and French Sudan, rather than to possibilities of navigation. As is stated in Chapter VI (p. 203), the French had rights of navigation on the lower Niger, through British territory, which they gave up for the same reason. Goods from Niger pass into Nigeria by road to Kano rather than by river.

A small inland waterway administration, with headquarters in Niger, runs ferry services for goods and personnel across the Niger on this stretch.

At Lollo, on the Nigeria-Dahomey frontier, there are more rapids. Below that point the river falls only 270 feet in its 400 miles to the sea. Traffic on this stretch is exclusively British, and high water is a year later than on the head-waters. Below the confluence of the Benue high water is in September, with another minor flood in January. River-levels vary by 35 feet during the year.

Throughout the 2,300-odd miles from Kouroussa to the sea the Niger is, everywhere, navigable for canoes. French engineering on the upper Niger will undoubtedly increase its value as a waterway between Bamako and Timbuktu, and political orientation alone prevents similar improvement between Gao and Nigeria.

RAILWAYS

THE first railways to be planned in French West Africa were those of Senegal in 1857. The first proposals were reconsidered in 1878, then the route was reconnoitred by the Compagnie des Batignolles,

and finally in 1885 a line was built by that company from Dakar to Thiès and St. Louis (160 miles away at the mouth of the Senegal). In 1931 a branch, from Louga on this line, was made to Linguéré.

The next line to be built was the important link between the waterways of the Senegal and the Niger. Starting at Kayes on the former it was to end at Koulikoro on the latter, and its construction, much hampered by an outbreak of yellow fever, went on from 1882 to 1906. The Senegal is not, however, a good all-year waterway, and the growing demands of both administration and commerce made it necessary to connect Kayes direct by rail to Thiès on the Dakar-St. Louis line. Starting from Thiès the new connexion reached Guinguiné in 1913, and Kayes, via Tambacounda, not until 1923. From Dakar to Koulikoro is 800 miles by this railway. Branches run south-west from Guinguiné to Kaolack, and northwards for 45 miles from Diourbel. The Dakar railway system is metre gauge, and had 195 locomotives (1939), 176 passenger coaches, and 2,439 goods trucks or vans (1940).

From 1900 onwards French railway policy aimed at connecting the coastal colonies to the rail and waterways leading westwards from French Sudan to Dakar.

The first to be undertaken (in 1900) was that from Conakry in French Guinea through Kouroussa on the Niger to Kankan on the Milo, a distance of 410 miles. Crossing Fouta Jalon, with its many rivers and forests, this line was the most difficult of all French West African railways to construct; gradients are up to 3 per cent., and bridges numerous. Work was finished in 1914, and since that time a considerable traffic serves eastern French Guinea, western French Sudan, and the upper Niger, for goods reach Kouroussa on that waterway. The railway is metre gauge and has 50 locomotives (1939), 36 passenger coaches, and 435 goods wagons (1940).

In 1903 a line was started northwards from Abidjan in the Ivory Coast. Construction was interrupted by local insurrections and by the 1914-1918 war. By 1934 railhead had reached Bobo Dioulasso, a distance of 500 miles. Present construction aims at connecting eastwards to Ouagadougou, indeed the earth works are already complete, and so tapping trade from the one-time territory of Upper Volta (now part of the Ivory Coast) lying north of the Gold Coast colony. In the Ivory Coast there are, of course, local features to surmount, but none of great importance. A small spur of this railway connects Abidjan to Port Bouet (14 miles). The gauge is metre throughout, and, in 1939, 64 locomotives, 37 passenger coaches, and 482 goods wagons completed the rolling-stock.

In French Sudan a narrow-gauge (60 cm. or approx. 2 ft.) railway runs southwards from Ségou to Douna. Whether this line is destined to reach Bobo Dioulasso, and so to link the Niger with Abidjan, is not known. The general pattern of the French railways suggests that the Conakry-Kankan railway, mentioned above, will be prolonged to Bobo Dioulasso, Ouagadougou, and eventually to Malanville on the Niger, close to the Nigerian frontier.

In Togo, whilst in German hands, there was no political reason for pushing the railway system farther north than trade required at the moment. Hence, as in the neighbouring British Gold Coast, lines were well developed only near the coast. From Lome railways were built to Palime in the north-west, Atakpame in the north, and Anecho in the east. Since 1918 the French have continued the Atakpame railway to Blita and had intended to prolong it to Sokode and perhaps to French Sudan. The system is metre gauge and the rolling-stock (1939) consists of 30 locomotives, 27 passenger coaches, and 414 goods wagons.

The railways of Dahomey are all metre gauge save for two 60-cm. branches, of which one runs north from Grand Popo, and the other, from Bohicon junction, west to Abomey and east to Zagnanado. The main strategic line (metre gauge) runs north to Parakou—270 miles from Cotonou—and is designed to continue to Malanville on the Niger, 210 miles farther on. The main-line rolling-stock included (1939) 31 locomotives, 44 passenger wagons, and 247 goods wagons.

The Gambia, Portuguese Guinea, and Liberia are innocent of railway development, and the railways of Sierra Leone and the Gold Coast, whilst serving the development of those colonies, are of no value to the French territories. The narrow gauge (2 ft. 6 in.) Sierra Leone railway connects Freetown and Pendembu (228 miles), near the frontier. An 82-mile branch from Bauya, 52 miles from Freetown, leads north to Makeni. The rolling-stock includes 46 locomotives, 69 passenger wagons, and 330 goods wagons. There is a privately owned, and very efficiently operated, 3 ft. 6 in. gauge railway which runs from Marampa to Pepel, a port opposite Freetown. This railway has over 200 goods wagons.

In the Gold Coast the railways converge on Kumasi from Takoradi and Accra. The gauge is 3 ft. 6 in., the combined length of the two branches 350 miles, and the area served contains the mineral and cocoa wealth of the colony. There are several branch lines serving purely local purposes. Rolling-stock includes 87 locomotives (3 narrow gauge), 1,082 goods wagons or trucks, and 159 passenger

coaches. The railways of Nigeria, on the other hand, do assist trade from both French West Africa (Niger) and the French Cameroons. Kaura Namoda, Kano, Nguru, and Jos are railheads connected by good roads to French territory, whilst Makurdi, on the Benue river, which taps the French Cameroons, is also useful to French trade. The two coastal termini are Lagos—or rather Iddo, across the creek from Lagos—and Port Harcourt. From these termini the two lines run north-east by north, and north, respectively, meeting at Kaduna. The Lagos line, which serves the largest native cities of Black Africa, continues to Kano and onwards north-east to Nguru, a total distance of 843 miles. The Port Harcourt line sends a spur from Kafanchan to Jos, serving the Bauchi plateau, and from Jos the one narrow-gauge (2 ft. 6 in.) line of Nigeria continues to Zaria on the Lagos-Kano line. From Zaria, too, a branch-line runs north-west to Kaura Namoda (138 miles). Altogether the railways of Nigeria are 1,900 miles in length, of which all are 3 ft. 6 in. gauge except the Jos-Zaria loop of 133 miles. The rolling-stock consists of 240 locomotives (13 narrow gauge), 340 passenger wagons, and 3,515 goods wagons.

It is interesting to note that there is substantially more rolling-stock available in British West Africa than in French.

The following table compares the capital spent on railway construction in the British Colonies and in French West Africa, up to 1934.

Nigeria	£230 million
Gold Coast	9·2 "
Sierra Leone	1·4 "
French West Africa	11·1 "
Togo	0·9 "

At the moment all new construction in French West Africa is hampered by lack of rails. The permanent way is in bad condition, rails are too light, and many sections will have to be relaid.

The idea of linking French North Africa and French West Africa—the Barbary States and the Niger—by rail is so interesting, and the construction of such a line might have such important consequences, that the project must be mentioned. Each of the Barbary States has its railway termini on the northern edge of the Sahara. The Dakar railways have reached St. Louis and Koulikoro, whilst French Guinea, the Ivory Coast, and Dahomey may soon be linked to the Niger, and so provide termini on the southern edge of the Sahara. There would remain 1,600 miles between. Ever since 1875 proposals have been made for bridging that gap, but the obvious difficulties of construction

have seemed too formidable. In 1941, however, the importance of additional land communication, since the Allies had cut communication by sea, decided Vichy to undertake the task. The new railway was to be the *Chemin de Fer Méditerranée-Niger*. The gauge was to be metre. The route chosen was from Colomb Béchar to Reggan, Bidon Cinq, Tabankort, and finally both Timbuktu and Niamey on the Niger. Colomb Béchar was to be linked northwards to Bou Arfa and so to Oudjda and the Oran-Fes railway, and this connexion has now actually been made. Construction at the other end may have begun. The extension from Koulikoro to Ségou is a part of this scheme, and railhead is to push on towards Timbuktu. Indeed, ultimately it is to continue as far as In Tassit, where the Vichy plan contemplates a junction. The main line was to continue across the Sahara, whilst another branch was to run south-east to Niamey.

From Niamey branches were to lead east to Zinder and Fort Lamy, connecting eventually to Bangui; south-east to Sokoto and Kaura Namoda, linking to the Nigerian system; and south to Parakou to join the main Dahomey railway.

The line was to be single throughout, but provided with passing-loops, and the central depot, with administrative buildings, workshops, and stores, was to be at Reggan. To avoid the difficulty of lack of water Diesel engines were to be used between Colomb Béchar and Tabankort.

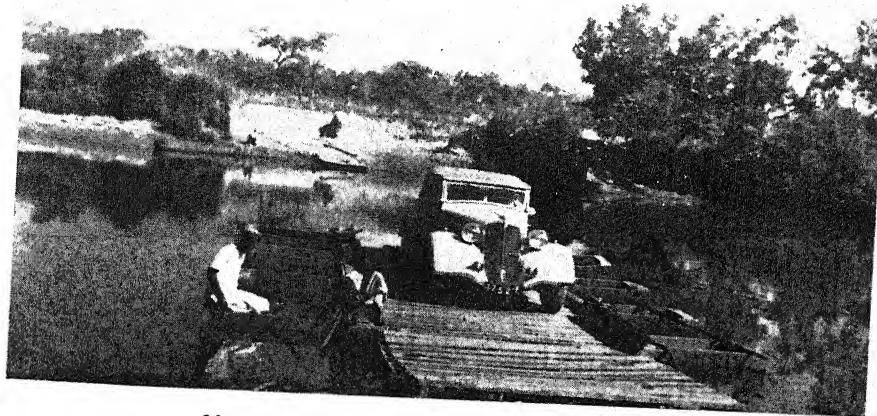
Before the landing of the Allies in North Africa, work on this ambitious project was proceeding fast in the north. Strong labour gangs were employed. Indeed, whatever future policy may dictate, the project has already made its mark.

ROADS

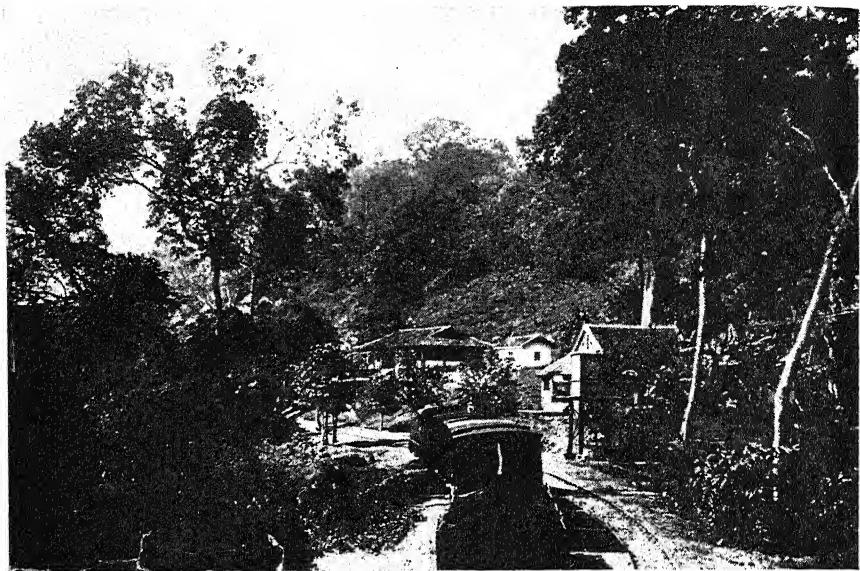
A FRENCH writer remarks that West Africa knew no wheels before Europeans appeared. It is certain that native tracks carried no more formidable vehicle than a light military wagon or a native bullock cart before the age of motor-cars. Road development, such as it is, started in this century and, at first, followed those native tracks over which head porters and slave gangs had passed for so many centuries. Even to-day, therefore, most roads outside the towns are badly graded and alined, particularly in the forest belt, and seldom have a stone foundation. Here and there in French West Africa, as in the Gold Coast, difficult stretches may have been surveyed, levelled, and realined, but this is the exception, not the rule. Construction and maintenance suffer from the lack of labour. Moreover, south of the Senegal and



87. *The coastal road near Lome*



88. *The ferry over the Tinkisso at Bissikrima*



89. Folata Station on the Conakry-Niger line



90. The railway depot, Lome

the Niger few roads are passable at the height of the rainy season or when neighbouring rivers are in flood. Rivers and streams, innumerable in the forest belt, add to the difficulties, and the pontoon ferries, for bridges are still rare, may cause an hour's delay. The rains and floods may limit traffic to one or two light cars a day, or may interrupt all passage for weeks on end. Tornadoes may stop traffic for days and, particularly in the forest belt, may block the road with fallen trees. For all that French West Africa was credited with 30,000 miles of motorable roads in 1937, and the motor lorry has begun to revolutionize native life.

In large urban areas, from Dakar to Lagos, roads are generally of European standard, soled, metalled, and tarmacked. Outside the large towns surface and durability depend upon the soil, and seasonal reliability upon the rains and the neighbouring rivers. Soils may be sand, clay, or laterite. The first is often impassable if too dry, the second if too wet, and the third, a curse to agriculture, is the best available material for surfacing. French practice is to mix clay and sand as far as possible on minor roads, and, on the more important, to put underneath a 6-inch layer of mixed seashells and stone dust, to gravel the surface, or cover it with laterite, and to add, here and there, tarmac or bitumen. Bridge building has gone on continuously, but the area in question is enormous and progress relatively slow. The better bridges are of reinforced concrete, but there are many of iron girders and wooden roadways. Here and there large rivers are crossed by masonry causeways which are submerged in times of flood. Generally speaking, the larger rivers must be crossed by ferry. The ferry pontoon, sometimes of steel boats, decked with good planking, is generally a matter of from four to six canoes roughly planked over. These ferries are generally pulled across along a stationary hawser, but are sometimes swing driven by the current, and sometimes just poled or paddled.

The important highways which serve a large and important traffic as well as the needs of administration and defence are called 'inter-colonial' and are the responsibility of the Federal Government. Over 8,000 miles of the 30,000 mentioned above come under this heading. Upkeep is done by the Public Works Department. All other roads are 'colonial', or the domestic responsibility of the colony concerned. Sometimes, especially perhaps in the Ivory Coast, the network is comparatively dense and the roads of the same standard as the inter-colonial. That is exceptional, however, and, for the most part, they follow old tracks with steep gradients where there are hills, poor alignment, and, in the forest, bad visibility.

On the main roads the maximum capacity may be taken as 100 vehicles in the 24 hours. Three-ton lorries with sand tyres are perhaps the most suitable transport. The maximum figure can only be reckoned on if maintenance is continuous, and, because of the difficulty of procuring labour, only a few roads could be kept up to this pitch at one and the same time. The pattern of French inter-colonial roads is a simple one. The main port is that of Dakar. Access from the south coast to the Niger has always been difficult because of the forest belt and of the powerful negro empires which dominated it. Access to, and exit from, the Sudan has therefore been through Senegal, and the most important road is that from Dakar to Zinder passing through Bamako, Bobo Dioulasso, Ouagadougou, and Niamey. To keep connexion with the Niger bend, subsidiary, but equally good, roads serve Ségou, Mopti, and Gao, Déougou, Ouahigouya, Dori, and San.

From the Ivory Coast, Togo, and Dahomey roads run north to join the main west-east axis, and a north-west to south-east road connects Senegal to French Guinea and the Ivory Coast, passing inland of Portuguese, British, and Liberian territories on the coast. Finally a fair road from Conakry in French Guinea runs east by north to join the west-east axis at Bobo Dioulasso. Intercolonial traffic is thus maintained without passing through foreign territories. Indeed, there is no all-weather motor-road connexion between them and French territories save for a secondary road north from the Gold Coast, and good connexions from Kano, in Nigeria, to Maradi and Zinder, although many unkept tracks are passable in the dry season.

As will appear in accounts of the individual colonies, a car, or light lorry, may travel on many subsidiary roads and tracks all over West Africa in dry weather, although, possibly, slowly and with many local difficulties. On the other hand, the system described above is designed to keep communication open for most of the year, and upon its upkeep most of the available labour is employed. It is impossible to say which roads are 'all weather' and which may be cut by floods. Short of very careful construction and a permanent upkeep staff, any road may be temporarily impassable. Naturally at river crossings, in the lower valleys, or along river-banks floods are likely to cause most delay, but tornadoes or exceptionally heavy rainfall may affect all roads. Fig. 78 should be studied as giving an idea of the times at which travel may be hampered.

'Imperial' roads are those which cross the Sahara and over which mechanical transport can move from the Barbary States to the Niger.

They connect to the 'intercolonial' roads of West Africa, but are unsurfaced and, indeed, unmade in the engineering sense. They are indeed nothing else than the best natural routes, so far established, for crossing the desert by car. They are marked by boulders, posts, or petrol cans, and the wheel tracks are often obliterated by sand. The

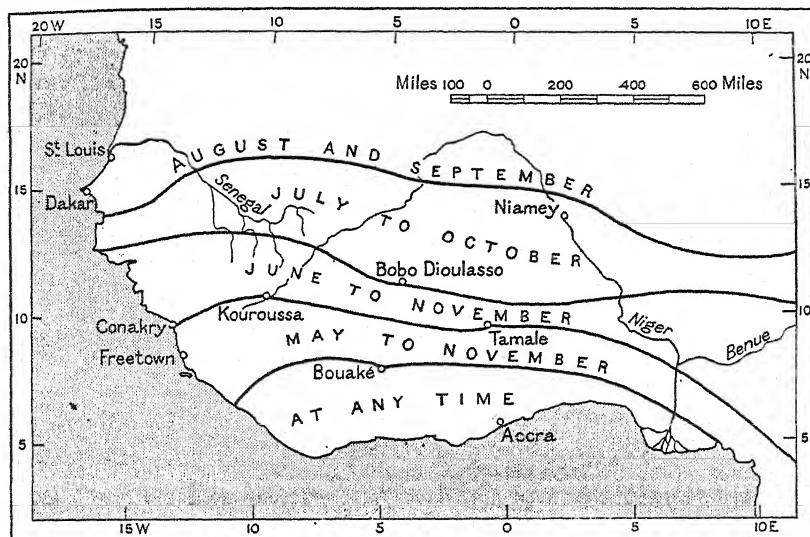


FIG. 78. Flood Periods

surface is sand, clay, or rock. Over rocky ridges and in the stony beds of dry watercourses the surface is dangerous and breakages to be feared. In the sand, cars are frequently brought to a stop and have to be dug out. Trellis-wire or planks are always carried for such an emergency. On the clay the surface may form waves (along the actual track) and may crack. Ouadis fill and are dangerous, after a storm or tornado, and especially on the Ahaggar route. All travellers who have used these tracks stress the importance of balloon tyres, but deprecate double wheels because of sand friction between them. Water is not such a difficulty as one would think, though distances between water-points are often great. For a moderate tourist traffic there is enough, but stages may prove uncomfortably long. For continuous traffic, or for the passage of large bodies of men, special arrangements would be necessary. The three main routes are those of Mauritania, Tanezrouft, and Ahaggar (see Fig. 77), but several others are possible.

At the end of the previous section, on railways, the new plan for communication between Colomb Béchar and the Niger was discussed. It was a feature of this plan that a well-engineered road should run alongside the railway. How much work, if any, has been done on this road is not known.

AIRWAYS

SEVERAL facts make it impossible to give full and useful information about airways in war. In the first place, actual permanent ground construction has far less significance than it has with other forms of transport. Aerodromes can be made, and routes changed, far more quickly. Secondly, and as a corollary, strategic, and economic considerations imply radical alterations which are operational and secret, and which may last no longer than operations themselves. A description here and now must be confined to those normal civil aviation services which existed in 1939, together with a statement of how far they operate to-day.

There is, of course, no question of the immense utility of air travel and transport in so vast a region as French West Africa, nor any doubt of their very great expansion to-morrow. A glance at Fig. 38 will show where Nature, especially in the forest belt, offers the greatest difficulties to the clearing of airfields and landing-grounds.

At the main airfields mentioned in the following list there are hangars, and good service. Meteorological and direction-finding stations are listed under Signals.

There are a number of good modern aerodromes and seaplane bases which are in constant use at the present time and will, no doubt, continue to be so after the war. Of these the Yumdum airfield near Brikama and south of Bathurst, the seaplane base at Bathurst, the Fisherman lake and Robertsport airfields in Liberia, and those at Takoradi, Accra, Lagos, Maiduguri, and Kano deserve special mention. So many lagoons and estuaries are suitable for seaplanes that it has been said that in French territories alone there are 92 emergency bases between Dakar and Pointe Noire (in French Equatorial Africa).

The control of civil aviation comes under the Governor-General.

ROUTES (all of which return by the same way)

*Summer 1939**Trunk Routes*

Air France (French)

1. Paris-Toulouse-Barcelona-Oran-Casablanca-Agadir-Villa Cisneros-Dakar-Natal (Brazil)-Santiago (Chile). Once weekly.
2. Paris-Toulouse-Barcelona-Oran-Casablanca-Agadir-Villa Cisneros-Dakar. Once weekly.

Régie Air Afrique (French).

1. Algiers-El Golea-Aoulef-Gao-Niamey-Zinder-Fort Lamy-Antananarivo. Once weekly.

Sabena (Belgian)

1. Brussels-Marseilles-Algiers-El Golea-Reggan-Gao-Niamey-Zinder-Fort Lamy-Bangui-Elisabethville. Once weekly.

Local Routes

Air France (French)

1. Dakar-Kaolack-Tambacounda-Kayes-Bamako. Once weekly.
2. Dakar-Kaolack-St. Louis. Once weekly.

Régie Air Afrique (French)

1. Gao-Timbuktu-Mopti-Ségou-Bamako. Once weekly.

Aéromaritime (French)

1. Dakar-Conakry-Monrovia-Abidjan-Accra-Cotonou-Lagos-Douala-Libreville-Port Gentil-Pointe Noire. Once weekly, with amphibian flying-boats.
2. Cotonou-Niamey. Once weekly.

Elders Colonial Airways Ltd. (Nigerian)

1. Freetown-Conakry-Bolama-Bissau-Bathurst. Once weekly.

*June 1943**Trunk Routes*

Air France (French)

1. Algiers-Oran-Casablanca-Agadir-Tindouf-Atar-Dakar. Once fortnightly.

2. Algiers - El Golea - Aoulef - Aguelock - Gao - Niamey - Bobo Dioulasso - Bamako - Dakar. Once fortnightly, as alternative to No. 1.

British Overseas Airways Corporation (British)

1. U.K.-Eire-Portugal-West Africa. Irregularly, with flying-boats.

Local Routes

Aéromaritime (French)

1. Dakar - Conakry - Freetown - Monrovia - Abidjan - Accra - Cotonou - Lagos. Once weekly, with amphibian flying-boats.
2. Dakar - Bathurst - Ziguinchor. Once weekly, with amphibian flying-boats.
3. Abidjan - Accra - Cotonou - Lagos - Douala - Libreville - Port Gentil - Pointe Noire. Once weekly with amphibian flying boats.
4. Cotonou - Niamey. Once weekly.

SIGNALS

DURING the War of 1914-1918 signal communications were at least doubled. Wireless transformed them in the years that followed. At the present time the varying fortunes of war have undoubtedly caused many and great additions and alterations. To be helpful to anyone in the present, or in the immediate future, a description must be general, and must include only what was characteristic of the country in 1939. To go further would be to leave fact for conjecture. The Communications map in the end pocket shows the extent of present knowledge.

Cables

As the map shows, there are full French and British services linking their respective colonies and ports. Intercommunication between the two has been largely cut, and so have certain other connexions to the outside world, during the times of effective German interference, but all these will, no doubt, be opened again.

Telegraphs

Telegraphs connect all the main towns of French West Africa. In 1929 nearly two million telegrams were sent from the post offices of Senegal and Dakar alone. Telegraph lines run mainly along railways

and the better roads. Upkeep is a difficult problem especially in the forest belt, and, towards the outer antennae of the system, the poles and construction generally are light and only semi-permanent. Communication is apt to be cut by storms, floods, and fallen trees.

Telephones are usual in the larger towns, and, generally too, in the areas immediately surrounding them. Long-distance calls are rarely possible. In 1929 a million and a half town calls were put through, but more than half of them in the towns of Senegal. Calls between towns were 160,000 and most of these were also in Senegal.

Wireless

It is natural that development of very recent times should rest more upon wireless than upon telegraph or telephone lines, and natural too that telegrams should be sent, often wholly, often partly, by wireless. About a hundred emitting stations are permanently installed in French West Africa alone, and, for defence, internal security, and administration, use is made of many additional mobile, generally military, stations. All the permanent stations will be described in detail in Vol. II dealing with the individual colonies. In this volume only stations of 1 kilowatt power or over will be listed, for these are able to reach the outside world. In West Africa, as a whole, there are 12 such stations, the 150-kilowatt station at Bamako being far the largest. Of the hundred French stations 7 are broadcasting centres, each of less than 1 kilowatt; 25 serve air traffic (including direction finding); 6 serve shipping; 3 broadcast meteorological data; 16 are for official work only, and 55 are commercial. All of them not listed in Table C are for internal and local use. In the British colonies there are wireless stations of 1 kilowatt or above at Lagos and Takoradi. Throughout West Africa reception is often bad, and interruption by atmospherics very common.

TABLE C

Wireless Stations with Power above 1 Kilowatt

Name of station	Approx. position	Wave-length, long, medium, or short	Power in kilowatts	Owner and remarks
Bamako	12° 39' N. 7° 58' W.	Long Short do.	150 10 5	Commercial station, with service to France and French colonies. Broadcasts meteorological bulletins.
Cotonou	6° 21' N. 2° 27' E.	Medium	1	Coast, commercial, and broadcasting stations, with service to French Cameroons. Broadcasting is at less than 1 kilowatt.
Dakar	14° 40' N. 17° 27' W.	Short do. Medium	20 5 1	Coastal and commercial stations. There is a service to France and French colonies. Broadcasting from Dakar is at 0·35, and at 0·2 kilowatts, and includes meteorological bulletins.
Dakar Aéradio and Aérogonio	14° 42' N. 17° 28' W.	Medium	2	Aeronautical and direction-finding station.
Dakar	14° 42' N. 17° 25' W.	Short	Unknown	Naval station service with Casablanca and Toulon.
Port Etienne	20° 54' N. 17° 03' W.	Medium	1	Coast and military stations.
Port Etienne	20° 54' N. 17° 03' W.	Medium	1	Aeronautical and direction-finding station.
St. Louis Aéradio	16° 00' N. 16° 31' W.	Medium	1	Aeronautical and direction-finding station.
Zinder Aéradio and Aérogonio	13° 47' N. 8° 58' E.	Medium	1	Aeronautical and direction-finding station. Zinder also broadcasts, but at less than 1 kilowatt.

CHAPTER XIII

MAPS AND AUTHORITIES

MAPS

General

The map in the end pocket is the southern half of a rather unwieldy sheet of 'North-West Africa' which is one of a series, published by Bartholomew, covering Africa at the scale of 1/4,000,000. For inclusion in a book, a map of so large a block of country as we are considering cannot be given on one single sheet at a larger scale. It must not be relied upon in detail. The railways and roads upon it do not accurately reproduce the present position, nor do any published maps, for progress is perpetual and maps lag behind the event. If, however, the difficulty of mapping this vast area is borne in mind and if it is realized that this is not a case of 'Ordnance Maps', the map in question will be found a useful general guide.

Maps of West Africa as a whole

French. The Service Géographique de l'Armée publishes two general small scale series. The 1/8,000,000 *Carte Générale d'Afrique* is not of much interest and is neither revised nor up to date. The 1/5,000,000 is a very useful series of seven sheets, three of which cover West Africa.

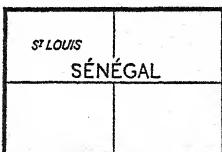
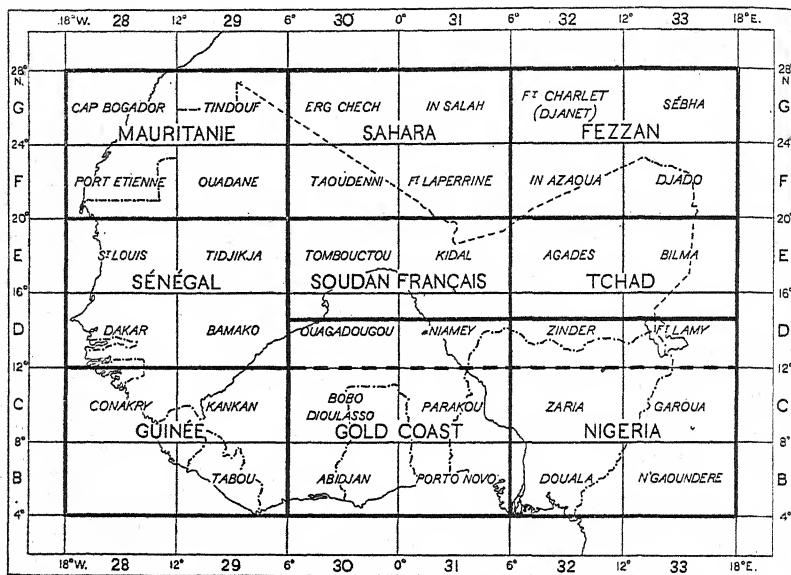
The *Atlas des Colonies Françaises* also takes three sheets in which to cover West Africa. Although these are good clear maps they are intermediate in scale between the 1/5,000,000 and the 1/2,000,000, presently to be described, and give neither the general impression of the former, nor the up-to-date detail of the latter.

International 1/1,000,000 and its derivative 1/2,000,000. The International 1/1,000,000 is large enough (in some cases too large) in scale to show the detail of so huge and comparatively unsurveyed an area. The convention under which this international series is produced leaves the publication of each sheet to the country under whose flag the greater part of the area in question lies, and place-names are spelt in accordance with the custom of each country.

The Anglo-French 1/2,000,000 is produced by the two countries because even the 1/1,000,000 is too large a scale for many of the vast areas of Africa.

Both series are reliable; both have 'air' editions, and both, during the war, are published by the Geographical Section, General Staff. In times of peace the French sheets are produced by the Service

Géographique de l'Armée in Paris, although local editions are also printed at Dakar. Fig. 79 is an index to the numbering, and the sheet lines, of these two series in West Africa. The origin of their numbering is at the intersection of the antimeridian of Greenwich and of



1:1,000,000 N.E28 ST LOUIS

1:2,000,000 N.E28.29 SÉNÉGAL
N.D28.29

The letters N.or S. written before the sheet number indicate that the sheet is north or south of the Equator.

FIG. 79. Index to 1/1M and 1/2M Maps

the Equator. The sheets of the 1/1,000,000 are each four degrees of latitude by six of longitude. The strip of latitude nearest to the equator is labelled A, and N(orth) or S(outh) is added according to hemisphere, whilst the strip of longitude immediately east of the antimeridian of Greenwich is numbered 1. Numbering and lettering then progress towards the nearer pole and eastwards respectively.

Maps of Special Subjects

Geological Maps. There is little uniformity in the geological maps

which cover French West Africa, for they are mainly reconnaissance. The Geological Survey began in 1931, but before then the outlines had been worked out by M. Henry Hubert, Administrator-in-Chief of the Colonies. The important maps available, some of which have been received too late to influence Fig. 23, are the following:

HUBERT, HENRY. *État actuel de nos connaissances sur la géologie de l'Afrique Occidentale: carte géologique (1/5,000,000) et notice explicative.* Paris (Larose), 1919.

— *Carte géologique de l'Afrique Occidentale Française au 1/1,000,000.* Sheets Bingerville (1917), Dakar (1920), Bamako (1926) and Ouagadougou (1926), respectively covering the Ivory Coast, Senegal, French Sudan, and Upper Volta. Paris (Larose).

'Esquisse géologique de l'Afrique Occidentale Française.' *Bulletin du Service des Mines de l'A.O.F.*, Dakar, 1939, No. 4, v+134 pp., with coloured geological map 1/5,000,000. [A summary of the geology and economic mineralogy.]

'Description pétrographique et étude géologique de la région forestière de la Guinée Française.' *Ibid.*, 1941, No. 5, xv+207 pp., with coloured geological maps 1/500,000 and 1/250,000. [With report on economic mineralogy.]

Carte géologique internationale de l'Afrique. 1/5,000,000. Sheet No. 1. Paris (Bureau d'Études Géologiques et Minières Coloniales), May 1936.

Others. A useful series of large sheets, covering French West Africa at the scale of 1/3,000,000, illustrates various aspects of natural and administrative detail. The ten maps are as follows: Administration; Cultures alimentaires, fourragères et médicinales; Oléagineux; Cultures industrielles; Curiosités, Sites, Chasse, Industries et Mets indigènes; Élevage; Ethnographie; Faune; Forêts; and Physique.

All of these were compiled by M. A. Meunier for the French Ministry of Colonies and are printed by the Imprimerie Photo-Metallo Millet, Asnières.

French West Africa

In most colonies, wherever they may be and under whatever flag, mapping has started with the route reconnaissances, topographical

sketches, and occasional astronomical observations of explorers. So it was with French West Africa, with the added advantage that most of her explorers were deliberate forerunners of occupation, and were soldiers who had practised topography and who had the advantage of half a century of French experience in the making of just such maps of Algeria. Monteil, Binger, Foureau, and Marchand are names which these first maps commemorate. The next stage lay in the more studied and detailed maps made by the military surveyors who accompanied troops of occupation. Since the time of Napoleon these *officiers topographes* have preceded French armies rather than followed them. Working mainly on the plane-table, such men have been busy in French West Africa since 1880, whenever operations have been in progress. Many parts are still mapped only at this level.

The final stage must begin with a general framework, of triangulation, of precise traversing, or of both. But the territory in question is vast, lends itself ill to triangulation, and has little money to spend. As a consequence the framework is still hardly begun, and consists of a latitudinal chain from Conakry, through Kouroussa, extending well into the Ivory Coast, together with a quadrilateral, on the north of the parallel, touching Kayes, Kita, and Satadougou. Something less than a twentieth part of the Federation is covered by this block, and, naturally, this is the area of the best mapping. Other attempted triangulations, at St. Louis, Dakar, and the seaboard of the Ivory Coast, failed to overcome natural difficulties. From 1904 onwards an alternative path has been followed. Astronomical observations have been used as a framework. Longitudes depend upon observations for time accompanied by time signals, telegraphic or wireless, and heights upon the barometer, the hygrometer, or both. Some 500 points have been fixed in this fashion. Whilst a framework of this sort is enough for mapping at any reasonable scale, it is not sufficiently consistent, or precise, for cadastral surveys or for that 'immatriculation' of which mention is made under the heading of land tenure.

Upon the framework described above some very useful mapping has been done. In 1931 it was summed up as follows:

Five per cent. had been really well mapped.

Twenty per cent. was covered by fairly good maps.

Twenty-five per cent. was reconnaissance, of the military expedition type.

Forty per cent. rested on the traverses and sketches of explorers.

Ten per cent. was still unmapped.

Since that date the better categories must have gained substantially.

The maps begin with the small-scale $1/5,000,000$, $1/2,500,000$, $1/2,000,000$, and $1/1,000,000$. All these cover the whole territory.

A very useful series at $1/500,000$ (8 miles to the inch) had thirty-six sheets and covered the country from lat. 16° to the Guinea coast; from the Atlantic to long. 6° E.

Senegal and French Guinea have good mapping at $1/200,000$, although it does not cover either colony. Both colonies, also, have a few sheets at $1/50,000$. The 'reconnaissance' $1/200,000$ covers considerable additional areas in the Ivory Coast and in French Sudan. There are also some $1/100,000$ sheets in Senegal and Dahomey. All these maps are published by the Service Géographique in Paris, and also, probably, by the local branch at Dakar. This local branch has had a chequered career. For some time it languished under the local Office of Works, but since 1921, under expert control, it has functioned directly under Federal headquarters. At this moment (1943) mapping and printing is done by the Army of Occupation, using the resources of the local Service Géographique.

Until the French Services begin a new peace-time regime, all maps of French West Africa must be secured from G.S.G.S., which prints all the important series. It is not necessary, however, to list these maps or to comment upon them, for edition follows edition and even scale follows scale, as the conduct of the war dictates.

British, Portuguese, Spanish, and Liberian Territories

The mapping of Rio de Oro and Liberia may be dismissed. All that is known of these territories (and perhaps more) is to be found upon the $1/1,000,000$ and $1/2,000,000$ scales.

Portuguese Guinea and the Gambia are better known, but even here the $1/1,000,000$ will provide all that is required.

Sierra Leone, the Gold Coast, and Nigeria are much better surveyed and mapped. All three have good survey departments, the latter two with drawing and printing establishments. Triangulation and precise traversing are far advanced in the Gold Coast and Nigeria. All three have been mapped largely on the one-inch or half-inch to a mile scales. Both in the Gambia and in Sierra Leone the most useful general maps are those at $1/500,000$. Each colony comes on a single sheet. The Gold Coast keeps up, and constantly reprints, its own $1/1,000,000$, which is the best map of reference and has the advantage of coming on the one sheet. The best reference map of Nigeria is the $1/2,000,000$.

On all maps positions may be half a mile, and heights a hundred

feet, in error. Fig. 80 provides a summary of the present state of mapping in French West Africa.

A final word must be said on place-names. Before the war no sort of international transliteration of place-names found its way on to

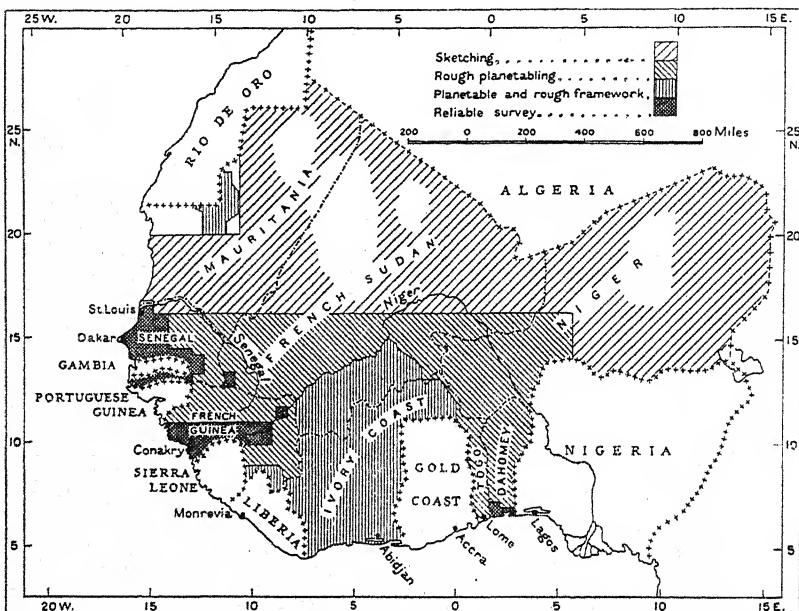


FIG. 80. *Reliability of Mapping in 1931*

any map. One of the rules of international mapping is that each national authority is entitled to have the place-names of its territory spelt in its own way. On other maps, not bound by international convention, variations naturally occur. Thus the French Tombouctou and Ouagadougou are the Timbuktu and Wagadugu of English maps. On the maps so efficiently produced in war there is no time to study the question. Maps of every country are copied just as they were originally produced. Timbuktu remains Tombouctou. The map in the end pocket is not consistent, but, because it happened to be convenient, it has been included, and its spellings have been followed in the text.

MAGNETIC VARIATION

Magnetic variation is shown by the usual true and magnetic north

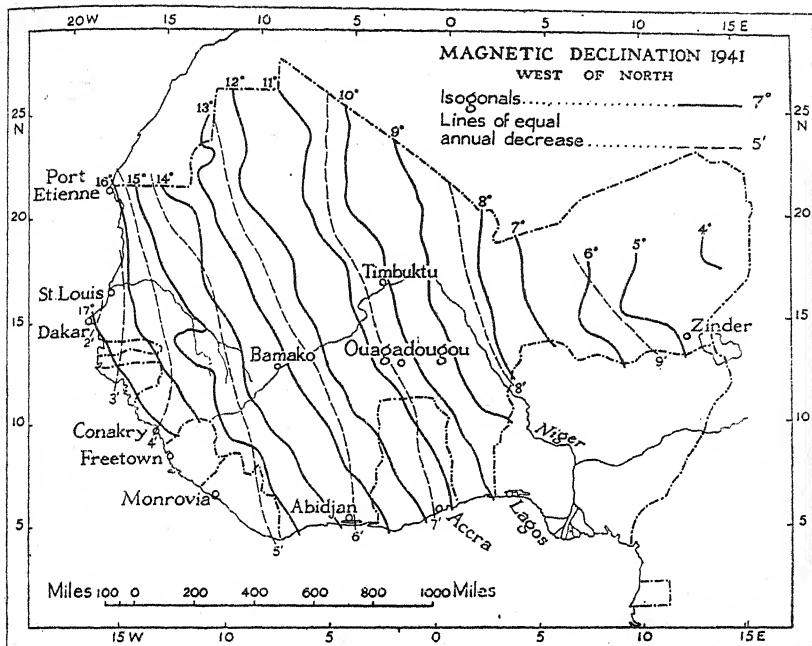


FIG. 81. Isogonals

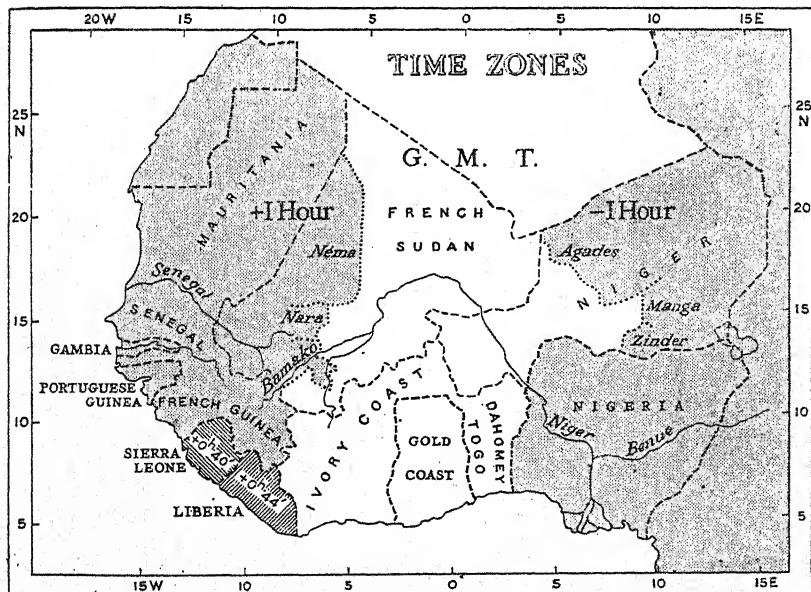


FIG. 82. Time Zones

points in the right-hand margins of all G.S.G.S. maps. The 'variation' given by these north points is that for the centre of the sheet concerned. In French West Africa there are numerous anomalies, and Fig. 81 shows isogonals for the whole country.

TIME

There are three main Time Zones, respectively one hour behind, contemporaneous with, and one hour ahead of Greenwich. It will be seen from Fig. 82 that these zones do not coincide with the inter-colonial boundaries, but in French Sudan and Niger divide province from province. On the map, therefore, the dotted lines indicate provincial boundaries and the pecked lines other boundaries.

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APPENDIX I

LIBERIA

Physical Description. Liberia has an area of some 43,000 square miles and a coastline of about 320 miles. It is mainly low-lying, but it rises gradually to the north and north-east, forming the seaward slopes of the Guinea Highlands, and there are numerous rivers. Most of the country is still unexplored.

Climate and Vegetation. The climate is hot and wet and the vegetation dense rain-forest.

History and Peoples. The early history of Liberia has been given on pp. 182-183. In 1910 the United States of America assumed the responsibility for Liberian finance, customs, military organization, and agriculture, and a loan for £400,000 was floated. In October 1942 U.S. troops landed. The total population is estimated at 1,250,000. The so-called Americo-Liberians, living in the coastal districts and numbering at most 20,000, dominate the native Mandingos, Golas, and Kroobays. They dress in European clothes and most of them are nominal Christians. English is the sole official language.

Agriculture. The land is naturally very fertile, but there is little organized agriculture except for rubber. The principal crops and products are rubber, manioc, cocoa, coffee, pine-apples, sweet potatoes, and yams.

Mining, Industries, and Commerce. No minerals of importance are mined, except gold, and there are no manufacturing industries. The chief export is rubber, most of which is grown on the six huge plantations of the Firestone Plantations Company. Other exports are palm kernels, gold, coffee, and cocoa. Imports are manufactured goods, both metal and textile. Most of Liberia's trade is with the U.S.A.

Towns. Monrovia (population c. 9,000) is the only town of any importance.

Ports. Strong currents prevail off the coast and landing is by surf boat only. There are nine ports of entry, of which Monrovia is the chief. It lies on the south bank of the mouth of the Diani (St. Paul) river, close under Cape Mesurado. There is anchorage in 6-8 fathoms off the town, but the harbour is poorly equipped. Steamer communication is regular with other West African ports and with Great Britain. In 1940, 245 ships called with a total registered tonnage of 715,797 tons. Of these, 102 were American, 71 British, and 48 Dutch.

Communications. No railways have yet been built, although the Firestone Plantations Company has an airfield. There are 180 miles of road fit for light motor traffic, but the commonest mode of communication is by portage along native tracks. There are wireless stations, but no telegraphs

or telephones outside the rubber plantations. Cables connect Monrovia with Conakry and Grand Bassam.

General Comments. Liberia is a potentially wealthy country still awaiting modern economic development. Its political relationship with the United States of America has always been close, and recent events have made it closer.

APPENDIX II

PORtUGUESE GUINEA

Physical Description. Portuguese Guinea has an area of 13,944 square miles. The mainland is composed of the islands and peninsulas formed by such large estuaries and arms of the sea as the Cacheo, the Mansôa, the Geba, and the Cacine. Very little of the land is more than 600 feet above sea-level, and there are very many rivers and swamps. No accurate computation of the length of the coastline has yet been made. Off shore are the Bissagos and other islands. Large tracts of the country are still little known.

Climate and Vegetation. The year is divided into two seasons, one wet and one dry. The former lasts approximately from May to November and the latter from December to April. The temperature is high throughout the year. During the wet season thunderstorms are frequent. The vegetation ranges from the mangroves of the coast through dense forest to savanna.

History. The coast of Portuguese Guinea was discovered in 1446, and from 1462 onwards sovereignty was claimed by the Kings of Portugal. In 1669 a station was established on the Corubal, and by 1690 Bissau was a flourishing slave port. The country was separated from the jurisdiction of the Governor of Cape Verde islands in 1879, and in 1886 a long series of disputes with France was settled by a boundary treaty.

Peoples and Administration. In 1938 the population was officially declared to be 415,220. Most of the natives are Mandingos or Fulani, and there are very few Christians or Moslems among them. The Portuguese, a mere handful in number, are mainly officials, and there are also some half-breeds. The Government has little influence over the inland tribes and had great difficulty in suppressing a revolt in 1917. The army consists of 8 officers and 279 other ranks, 274 of whom are natives. In 1939 the budget balanced at 30,394,531 escudos (£303,945); some of this money was spent on education, as there are 19 elementary and 2 technical schools.

Diseases. The principal diseases are malaria, blackwater fever, sleeping-sickness, small-pox, leprosy, yaws, and filariasis. Medical facilities are very poor.

Agriculture, Mining, and Commerce. Rice is grown near the coast, and bananas, oil palms, and ground-nuts farther inland. Cattle, sheep, and goats are found almost everywhere, but the quality of the stock is low. There is a little iron mining by Mandingos. The principal exports are rice, wax, palm oil, and hides, and the principal imports are manufactured goods. Most of the trade is in the hands of Frenchmen or Belgians.

Towns and Ports. Cacheo, Bissau, and Bolama are the chief ports of Portuguese Guinea, but none of them has been developed to any degree.

They are all approached through deep water with no bar, but tidal streams are strong. Communication between them, and north to the Casamance and Gambia rivers, is easy, due to the depth of water and to the numerous channels (*marigots*) intersecting the coastal areas. In 1933, 108 vessels with a total registered tonnage of 171,672 tons entered the ports. Bissau ($11^{\circ} 52'$; $15^{\circ} 53'$ W.), the most important port, stands on the fertile and thickly populated island of the same name in the north of the vast estuary of the Geba river. Portuguese number about 800 of the total population of 2,000. It was made a free port in 1869. The European town is surrounded by a walled fort, and opposite the fort there is well-sheltered anchorage in 40 feet. Vessels of 36 feet draught can reach Bissau at low water by the Geba canal. A T-shaped concrete wharf, fronting the port, has an alongside depth of 19 feet and it can accommodate vessels of 8,000 tons. Small repairs can be effected. There is a wireless station. There is regular communication with Dakar and France. Bolama ($11^{\circ} 34'$; $15^{\circ} 26'$ W.), the capital, stands on the east or landward side of Bolama island, which is well cultivated and is the most easterly of the Bissagos archipelago. The town dates from 1792, and is sometimes known as Port Beaver after its founder. The present population is about 2,000, of whom 300 are Portuguese. Anchorage is in 11 fathoms off the mole, but at the mole itself the depth is only $1\frac{1}{2}$ feet. Cacheo ($12^{\circ} 18'$; $16^{\circ} 10'$ W.) lies 20 miles up the estuary of the Cacheo river, on the south bank. Anchorage is in 5 fathoms off the port. For vessels up to 1,500 tons there are two wooden landing-stages. Palm kernels and ground-nuts are exported.

Communications. The natural waterways afford the easiest means of communication, but there are also 1,863 miles of rough roads and tracks. There are 372 miles of telegraph lines, a cable connects Bolama and Bissau with Bathurst, and there is a wireless station at Bolama.

General Comments. Portuguese Guinea is so poorly drained and so unhealthy for Europeans that it seems doubtful if any great change in its status or prosperity will take place until the distant future.

APPENDIX III

RIO DE ORO

Physical Description. Rio de Oro stretches along the Atlantic coast for some 600 miles and has an approximate area of 109,200 square miles. Most of it is rocky desert, but in the south there are extensive sand-dunes. The coast itself, washed by the Canary current, has few indentations, many cliffs, and occasional beaches.

Climate and Vegetation. The climate is that of a typical trade-wind desert, with predominantly off-shore winds. Vegetation is scanty except for some patches of poor grass and scrub.

Political Status. There are three separate zones. (1) Southern (to 26° N.; the Colony of Rio de Oro): this was ceded by local chiefs to the absolute authority of Spain in 1886. (2) Central (to 27° 40' N.; Spanish Sahara): this is technically a 'sphere of influence'. (3) Northern (the Protectorate): this is part of the Sherifian Empire, protected under the Franco-Spanish Treaty of 1912. All these zones are under the Spanish High Commissioner at Tetouan. Effective government is limited to the coastal strip; but the interior was pacified in 1934, and is patrolled by Spanish Moroccan troops and by local camel corps.

Peoples. The total population is estimated at between 30,000 and 50,000, of whom 800 are Europeans. The natives are Arabs or Berbers, many of the latter having negro blood, and are mostly nomadic pastoralists.

Agriculture. There is virtually no cultivation, but there are fair numbers of animals, principally sheep, goats, and camels.

Diseases. The commonest diseases are malaria, syphilis, typhus, and intestinal parasitic diseases. Europeans are liable to suffer from heat stroke and conjunctivitis. There is little sanitary equipment other than the desert air and sunshine.

Towns. There is a settlement at La Aguera and an airfield at Cape Juby. Otherwise the only town is Villa Cisneros (population c. 500). There are no good ports.

Mining, Industries, and Commerce. Small deposits of iron are worked by the natives, and copper, potash, and salt also exist. Industry is confined to a few simple domestic manufactures. The only commercial asset of Rio de Oro is the fish of its coastal waters. The local fleet comprises a few old craft, and most of the fishing-boats come from Spain, France, Italy, and Norway. In 1920 the total catch was said to be 17,000,000 tons, the principal fish being the sardine. There is a small number of fish-curing factories.

Communications. Rough tracks afford the only means of surface communication, and signal communication is effected by wireless. Since 1927 Cape Juby and Villa Cisneros have been stopping-places on the Toulouse-Dakar air route. Airfields exist at these two places and at La Aguera.

APPENDIX IV

CONVERSION TABLES

METRIC AND BRITISH UNITS

All metallic standards are subject to molecular change. Tables differ according to the date of the comparison on which they rest. These are based on the 1896 comparison between Yard and Metre, which gives:

$$1 \text{ metre} = 39.370113 \text{ inches.}$$

Tables 1 to 6 give the ratios between units of the same sort.

Space, and printing, deny the use of many decimal figures. Therefore such a figure as 0.0000032 is given as 3.2×10^{-7} (which means that the first significant figure is the seventh after the decimal point: 0.0001925 becomes 1.925×10^{-4} , and 0.0000734 is 7.34×10^{-6}).

Tables 7 to 20 give ratios *in extenso* between single units.

These deal with conversions from metric into the equivalent British units.

Figures referring to metric units are given in italics; metric units (1 to 9) are given at the top of each table, reading horizontally from left to right; metric tens read vertically from top to bottom on extreme right and left of the table.

Thus in Table 8, if 87 centimetres are to be converted to inches, the 8 is read on the left edge, and following the horizontal line until it comes in the 7 unit column the answer 34.252 is read.

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1. Units of Length
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TABLE 1. UNITS OF LENGTH

<i>Nautical mile</i>	<i>Statute mile</i>	<i>Kilometre</i>	<i>Metre</i>	<i>Yard</i>	<i>Foot</i>	<i>Inch</i>	<i>Centimetre</i>
1	1.152	1.853	1853	2027	16080	72,960	185,300
3.684×10^{-1}	1×10^{-1}	1.60934	1609.34	1760	5280	$63,360$	$100,934$
5.396×10^{-1}	6.21372×10^{-1}	1×10^{-1}	1000	1093.61	3280.84	$39,370.1$	$100,000$
5.396×10^{-4}	6.21372×10^{-4}	1×10^{-3}	1	1.09361	3.28084	$39,3701$	100
4.934×10^{-4}	5.68182×10^{-4}	9.14399×10^{-4}	9.14399×10^{-4}	1	3	36	91.4399
1.645×10^{-4}	1.89394×10^{-4}	3.048×10^{-4}	3.048×10^{-4}	3.33333×10^{-1}	1	1.2	$30.48(00)$
1.371×10^{-5}	1.57828×10^{-5}	2.54×10^{-5}	2.54×10^{-5}	2.77778×10^{-2}	8.33333×10^{-2}	1	$2.54(000)$
5.396×10^{-6}	6.21372×10^{-6}	1×10^{-6}	1	1.09361×10^{-2}	3.28084×10^{-2}	3.93701×10^{-1}	1

† This is the customary British practice, and not the international nautical mile, of 1852 metres, which Great Britain has not adopted.

Rough rules: 1 millimetre = 0.04 inch.

1 metre = $\frac{1}{3}$ feet.

1 kilometre = $\frac{1}{6}$ of a mile.

TABLE 2. UNITS OF AREA

<i>Square mile</i>	<i>Square kilometre</i>	<i>Hectare</i>	<i>Acre</i>	<i>Square metre</i>	<i>Square yard</i>	<i>Square foot</i>
1	2.58998	258.998	640	$258,998 \times 10$	$30,976 \times 10^2$	$278,784 \times 10^2$
3.86103×10^{-1}	1×10^{-1}	100	247.106	1,000,000	$119,599 \times 10$	$107,639 \times 10^2$
3.86103×10^{-3}	1×10^{-3}	1×10^{-1}	247.106	10,000	11.9599	$107,639$
1.5625×10^{-3}	4.04685×10^{-3}	4.04685×10^{-1}	1×10^{-1}	4946.85	4840	43,560
3.86103×10^{-7}	1×10^{-7}	1×10^{-4}	2.47106×10^{-4}	1×10^{-4}	1.19599	107639
3.22831×10^{-7}	8.36126×10^{-7}	8.36126×10^{-5}	2.06612×10^{-4}	8.36126×10^{-4}	1×10^{-4}	9
3.58701×10^{-8}	9.29029×10^{-8}	9.29029×10^{-6}	2.29568×10^{-5}	9.29029×10^{-5}	1.11111×10^{-1}	1

Rough rules: 1 square kilometre = $\frac{1}{6}$ square mile.

1 hectare = $2\frac{1}{2}$ acres.

CONVERSION TABLES

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TABLE 3. UNITS OF VOLUME

Kilotonne	Cubic metre	Cubic yard	Bushel	Cubic feet	Imp. gall.	Litre	Pint
I	1.000027	1.30799	27.4969	3.53157	219.976	1000	1759.80
9.99973 $\times 10^{-1}$	1.30795	27.4962	21.0223	3.53148	219.970	999.973	1759.75
7.64532 $\times 10^{-1}$	7.64553 $\times 10^{-1}$	I		27	168.178	764.532	1345.43
3.63677 $\times 10^{-2}$	3.63687 $\times 10^{-2}$	4.75685 $\times 10^{-2}$	I	1.28435	8	36.3677	64
2.83160 $\times 10^{-2}$	2.83167 $\times 10^{-2}$	3.70370 $\times 10^{-2}$	7.78602 $\times 10^{-1}$	I	6.22882	28.3160	49.8306
4.54596 $\times 10^{-3}$	4.54608 $\times 10^{-3}$	5.94667 $\times 10^{-3}$	1.25 $\times 10^{-1}$	1.60544 $\times 10^{-1}$	I	4.54596	8
1.0 $\times 10^{-3}$	1.000027 $\times 10^{-3}$	1.30799 $\times 10^{-3}$	2.74969 $\times 10^{-2}$	3.53157 $\times 10^{-2}$	2.19976 $\times 10^{-1}$	I	1.75980
5.68245 $\times 10^{-4}$	5.68260 $\times 10^{-4}$	7.43258 $\times 10^{-4}$	1.5025 $\times 10^{-4}$	2.00680 $\times 10^{-2}$	1.25 $\times 10^{-1}$	5.68245 $\times 10^{-1}$	I

TABLE 4. UNITS OF WEIGHT

Ton	Millier or metric ton	Quintal	Kilogram	Ib.
I	1.01605	1.01605	1016.05	2240
9.84207 $\times 10^{-1}$	I	10	1000	2204.62
9.84207 $\times 10^{-2}$	1.0 $\times 10^{-1}$	I	100	2204.62
9.84207 $\times 10^{-3}$	1.0 $\times 10^{-2}$	I	4.53592 $\times 10^{-1}$	2.204.62
4.46429 $\times 10^{-4}$	4.53592 $\times 10^{-4}$			I

Rough rule: To turn metric into British tons deduct $1\frac{1}{2}$ per cent.

Note. The ton of 2,240 lb is sometimes called the "Long Ton" to distinguish it from an occasionally used "Short Ton" of 2,000 lb.

TABLE 5. UNITS OF PRESSURE

<i>Atmosphere normal 760 mm. Hg at 0° C. (g = 980.665 cm. per sec. per sec.)</i>	<i>Bar (= 10⁶ dynes per sq. cm.)</i>	<i>lb. per sq. inch (g = 980.665 cm. per sec. per sec.)</i>	<i>Inches of mercury at 32° F. (g = 980.665 cm. per sec. per sec.)</i>	<i>Millibars (1,000 dynes per sq. cm.)</i>
$1 \times 986923 \times 10^{-1}$	$1 \cdot 03325$	$1 \cdot 46959$	$29 \cdot 9213$	$1013 \cdot 25$
$6 \cdot 80461 \times 10^{-2}$	$6 \cdot 89477 \times 10^{-2}$	$14 \cdot 5037$	$29 \cdot 5300$	1000
$3 \cdot 34210 \times 10^{-2}$	$3 \cdot 38639 \times 10^{-2}$	$4 \cdot 91153 \times 10^{-1}$	$2 \cdot 03603$	$68 \cdot 9477$
$9 \cdot 866923 \times 10^{-4}$	$9 \cdot 0 \times 10^{-3}$	$1 \cdot 45037 \times 10^{-2}$	$1 \times 2 \cdot 95300 \times 10^{-2}$	$33 \cdot 8639$

TABLE 6. YIELD PER AREA

<i>Ton per acre</i>	<i>Metric ton per hectare</i>	<i>Quintal per hectare</i>
$1 \times 3 \cdot 98294 \times 10^{-1}$	$2 \cdot 51071$	$25 \cdot 1071$
$3 \cdot 98294 \times 10^{-2}$	1×10^{-1}	10
		1

TABLE 7. METRES TO FEET. 1 metre = 3.28084 feet

	0	1	2	3	4	5	6	7	8	9
I	3'3	6'6	9'8	13'1	16'4	19'7	23'0	26'3	29'5	
2	32'8	36'1	39'4	42'7	45'9	49'2	52'5	55'8	59'1	62'3
3	65'6	68'9	72'2	75'5	78'7	82'0	85'3	88'6	91'9	95'1
4	98'4	101'7	105'0	108'3	111'6	114'8	118'1	121'4	124'7	128'0
5	131'2	134'5	137'8	141'1	144'4	147'6	150'9	154'2	157'5	160'8
6	164'0	167'3	170'6	173'9	177'2	180'5	183'7	187'0	190'3	193'6
7	196'9	200'1	203'4	206'7	210'0	213'3	216'5	219'8	223'1	226'4
8	229'7	232'9	236'2	239'5	242'8	246'1	249'3	252'6	255'9	259'2
9	262'5	265'8	269'0	272'3	275'6	278'9	282'2	285'4	288'7	292'0
10	295'3	308'6	301'8	305'1	308'4	311'7	315'0	318'2	321'5	324'8
11	328'1	331'4	334'6	337'9	341'2	344'5	347'8	351'0	354'3	357'6
12	360'9	364'2	357'5	370'7	374'0	377'3	380'6	383'9	387'1	390'4
13	393'7	397'0	400'3	403'5	406'8	410'1	413'4	416'7	419'9	423'2
14	426'5	429'8	433'1	436'4	439'6	442'9	446'2	449'5	452'8	456'0
15	459'3	462'6	465'9	469'2	472'4	475'7	479'0	482'3	485'6	488'8
16	492'1	495'4	498'7	502'0	505'2	508'5	511'8	515'1	518'4	521'7
17	524'9	528'2	531'5	534'8	538'1	541'3	544'6	547'9	551'2	554'5
18	557'7	561'0	564'3	567'6	570'9	574'1	577'4	580'7	584'0	587'3
19	590'6	593'8	597'1	600'4	603'7	607'0	610'2	613'5	616'8	620'1
20	623'4	626'6	629'9	633'2	636'5	639'8	643'0	646'3	649'6	652'9
21	656'2	659'4	662'7	666'0	669'3	672'6	675'9	679'1	682'4	685'7
22	689'0	692'3	695'5	698'8	702'1	705'4	708'7	711'9	715'2	718'5
23	721'8	725'1	728'3	731'6	734'9	738'2	741'5	744'8	748'0	751'3
24	754'6	757'9	761'2	764'4	767'7	771'0	774'3	777'6	780'8	784'1
25	787'4	790'7	794'0	797'2	800'5	803'8	807'1	810'4	813'7	816'9
26	820'2	823'5	826'8	830'1	833'3	836'6	839'9	843'2	846'5	849'7
27	853'0	856'3	859'6	862'9	866'1	869'4	872'7	876'0	879'3	882'5
28	885'8	889'1	892'4	895'7	899'0	902'2	905'5	908'8	912'1	915'4
29	918'6	921'9	925'2	928'5	931'8	935'0	938'3	941'6	944'9	948'2
30	951'4	954'7	958'0	961'3	964'6	967'8	971'1	974'4	977'7	981'0
31	984'3	987'5	990'8	994'1	997'4	1000'7	1003'9	1007'2	1010'5	1013'8
32	1017'1	1020'3	1023'6	1026'9	1030'2	1033'5	1036'7	1040'0	1043'3	1046'6
	1049'9	1053'1	1056'4	1059'7	1063'0	1066'3	1069'6	1072'8	1076'1	1079'4

CONVERSION TABLES

	0	1	2	3	4	5	6	7	8	9
33	1082.7	1086.0	1089.2	1092.5	1095.8	1099.1	1102.4	1105.6	1108.9	1112.2
34	1115.5	1118.8	1122.0	1125.3	1128.6	1131.9	1135.2	1138.5	1141.7	1145.0
35	1148.3	1151.6	1154.9	1158.1	1161.4	1164.7	1168.0	1171.3	1174.5	1177.8
36	1181.1	1184.4	1187.7	1190.9	1194.2	1197.5	1200.8	1204.1	1207.3	1210.6
37	1213.9	1217.2	1220.5	1223.8	1227.0	1230.3	1233.6	1236.9	1240.2	1243.4
38	1246.7	1250.0	1253.3	1256.6	1259.8	1263.1	1266.4	1269.7	1273.0	1276.2
39	1279.5	1282.8	1286.1	1289.4	1292.7	1295.9	1299.2	1302.5	1305.8	1309.1
40	1312.3	1315.6	1318.9	1322.2	1325.5	1328.7	1332.0	1335.3	1338.6	1341.9
41	1345.1	1348.4	1351.7	1355.0	1358.3	1361.5	1364.8	1368.1	1371.4	1374.7
42	1378.0	1381.2	1384.5	1387.8	1391.1	1394.4	1397.6	1400.9	1404.2	1407.5
43	1410.8	1414.0	1417.3	1420.6	1423.9	1427.2	1430.4	1433.7	1437.0	1440.3
44	1443.6	1446.9	1450.1	1453.4	1456.7	1460.0	1463.3	1466.5	1469.8	1473.1
45	1476.4	1479.7	1482.9	1486.2	1489.5	1492.8	1496.1	1499.3	1502.6	1505.9
46	1509.2	1512.5	1515.7	1519.0	1522.3	1525.6	1528.9	1532.2	1535.4	1538.7
47	1542.0	1545.3	1548.6	1551.8	1555.1	1558.4	1561.7	1565.0	1568.2	1571.5
48	1574.8	1578.1	1581.4	1584.6	1587.9	1591.2	1594.5	1597.8	1601.0	1604.3
49	1607.6	1610.9	1614.2	1617.5	1620.7	1624.0	1627.3	1630.6	1633.9	1637.1
50	1640.4	1643.7	1647.0	1650.3	1653.6	1656.8	1660.1	1663.4	1666.7	1669.9
51	1673.2	1676.5	1679.8	1683.1	1686.4	1689.6	1692.9	1696.2	1699.5	1702.8
52	1706.0	1709.3	1712.6	1715.9	1719.2	1722.4	1725.7	1729.0	1732.3	1735.6
53	1738.8	1742.1	1745.4	1748.7	1752.0	1755.2	1758.5	1761.8	1765.1	1768.4
54	1771.7	1774.9	1778.2	1781.5	1784.8	1788.1	1791.3	1794.6	1797.9	1801.2
55	1804.5	1807.8	1811.0	1814.3	1817.6	1820.9	1824.1	1827.4	1830.7	1834.0
56	1837.3	1840.6	1843.8	1847.1	1850.4	1853.7	1857.0	1860.2	1863.5	1866.8
57	1870.1	1873.4	1876.6	1879.9	1883.2	1886.5	1889.8	1893.0	1896.3	1899.6
58	1902.9	1906.2	1909.4	1912.7	1916.0	1919.3	1922.6	1925.9	1929.1	1932.4
59	1935.7	1939.0	1942.3	1945.5	1948.8	1952.1	1955.4	1958.7	1961.9	1965.2
60	1968.5	1971.8	1975.1	1978.3	1981.6	1984.9	1988.2	1991.5	1994.8	1998.0
61	2001.3	2004.6	2007.9	2011.1	2014.4	2017.7	2021.0	2024.3	2027.6	2030.8
62	2034.1	2037.4	2040.7	2044.0	2047.2	2050.5	2053.8	2057.1	2060.4	2063.6
63	2066.9	2070.2	2073.5	2076.8	2080.1	2083.3	2086.6	2089.9	2093.2	2096.5
64	2099.7	2103.0	2106.3	2109.6	2112.9	2116.1	2119.4	2122.7	2126.0	2129.3
65	2132.5	2135.8	2139.1	2142.4	2145.7	2149.0	2152.3	2155.5	2158.8	2162.1
66	2168.6	2172.9	2175.2	2178.5	2181.8	2185.1	2188.3	2191.6	2194.9	2197.6

CONVERSION TABLES

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>	<i>o</i>	<i>p</i>	<i>q</i>	<i>r</i>	<i>s</i>	<i>t</i>	<i>u</i>	<i>v</i>	<i>w</i>	<i>x</i>	<i>y</i>	<i>z</i>																			
67	2198·2	2201·5	2204·7	2208·0	2211·3	2214·6	2217·9	2221·1	2224·4	2227·7	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
68	2231·0	2234·3	2237·5	2240·8	2244·1	2247·4	2250·7	2253·9	2257·2	2260·5	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	
69	2263·8	2267·1	2270·4	2273·6	2276·9	2280·2	2283·5	2286·8	2290·0	2293·2	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100		
70	2296·6	2299·9	2303·2	2306·4	2309·7	2313·0	2316·3	2319·6	2322·8	2326·1	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100			
71	2329·4	2332·7	2336·0	2339·2	2342·5	2345·8	2349·1	2352·4	2355·6	2358·9	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100				
72	2362·2	2365·5	2368·8	2372·0	2375·3	2378·6	2381·9	2385·2	2388·5	2391·7	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100					
73	2395·0	2398·3	2401·6	2404·9	2408·1	2411·4	2414·7	2418·0	2421·3	2424·5	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100						
74	2427·8	2431·1	2434·4	2437·7	2440·9	2444·2	2447·5	2450·8	2454·1	2457·3	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100							
75	2460·6	2463·9	2467·2	2470·5	2473·8	2477·0	2480·3	2483·6	2486·9	2490·2	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100								
76	2493·4	2496·7	2500·0	2503·3	2506·6	2509·8	2513·1	2516·4	2519·7	2523·0	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100									
77	2526·2	2529·5	2532·8	2536·1	2539·4	2542·7	2545·9	2549·2	2552·5	2555·8	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100										
78	2559·1	2562·3	2565·6	2568·9	2572·2	2575·5	2578·7	2582·0	2585·3	2588·6	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100											
79	2591·9	2595·1	2598·4	2601·7	2605·0	2608·3	2611·5	2614·8	2618·1	2621·4	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100												
80	2624·7	2628·0	2631·2	2634·5	2637·8	2641·1	2644·4	2647·6	2650·9	2654·2	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100													
81	2657·5	2660·8	2664·0	2667·3	2670·6	2673·9	2677·2	2680·4	2683·7	2687·0	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100														
82	2690·3	2693·6	2696·9	2700·1	2703·4	2706·7	2710·0	2713·3	2716·5	2719·8	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100															
83	2723·1	2726·4	2729·7	2732·9	2736·2	2739·5	2742·8	2746·1	2749·3	2752·6	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																
84	2755·9	2759·2	2762·5	2765·7	2769·0	2772·3	2775·6	2778·9	2782·2	2785·4	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																	
85	2788·7	2792·0	2795·3	2798·6	2801·8	2805·1	2808·4	2811·7	2815·0	2818·2	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																		
86	2821·5	2824·8	2828·1	2831·4	2834·6	2837·9	2841·2	2844·5	2847·8	2851·0	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																			
87	2854·3	2857·6	2860·9	2864·2	2867·5	2870·7	2874·0	2877·3	2880·6	2883·9	87	88	89	90	91	92	93	94	95	96	97	98	99	100																				
88	2887·1	2890·4	2893·7	2897·0	2900·3	2903·5	2906·8	2910·1	2913·4	2916·7	88	89	90	91	92	93	94	95	96	97	98	99	100																					
89	2919·9	2923·2	2926·5	2929·8	2933·1	2936·4	2939·6	2942·9	2946·2	2949·5	89	90	91	92	93	94	95	96	97	98	99	100																						
90	2952·8	2956·0	2959·3	2962·6	2965·9	2969·2	2972·4	2975·7	2979·0	2982·3	90	91	92	93	94	95	96	97	98	99	100																							
91	2985·6	2988·8	2992·1	2995·4	2998·7	3000·0	3002·3	3004·5	3006·8	3011·8	91	92	93	94	95	96	97	98	99	100																								
92	3018·4	3021·7	3024·9	3028·2	3031·5	3034·8	3038·1	3041·3	3044·6	3047·9	92	93	94	95	96	97	98	99	100																									
93	3051·2	3054·5	3057·7	3061·0	3064·3	3067·6	3070·9	3074·1	3077·4	3080·7	93	94	95	96	97	98	99	100																										
94	3084·0	3087·3	3090·6	3093·8	3097·1	3100·4	3103·7	3107·0	3110·2	3113·5	94	95	96	97	98	99	100																											
95	3116·8	3120·1	3123·4	3126·6	3129·9	3133·2	3136·5	3139·8	3143·0	3146·3	95	96	97	98	99	100																												
96	3149·6	3152·9	3156·2	3159·4	3162·7	3166·0	3169·3	3172·6	3175·9	3179·1	96	97	98	99	100																													
97	3182·4	3185·7	3189·0	3192·3	3195·5	3198·8	3202·1	3205·4	3208·7	3211·9	97	98	99	100																														
98	3215·2	3218·5	3221·8	3225·1	3228·3	3231·6	3234·9	3238·2	3241·5	3244·8	98	99	100																															
99	3248·0	3251·3	3254·6	3257·9	3261·4	3264·4	3267·7	3271·0	3274·3	3277·6	99																																	

TABLE 8. CENTIMETRES TO INCHES

1 centimetre = 0.393701 inches

TABLE 9. KILOMETRES TO STATUTE MILES

1 kilometre = 0.621372 miles

TABLE 10. SQUARE METRES TO SQUARE FEET

11 square metre = 10,763911 square feet

TABLE 11. HECTARES TO ACRES

1 hectare = 2.47106 acres

TABLE 12. SQUARE KILOMETRES TO SQUARE MILES

1 square kilometre = 0.386103 square miles

TABLE 13. CUBIC METRES TO CUBIC FEET

1 cubic metre = 35·3148 cubic feet

CONVERSION TABLES

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TABLE 14. KILOGRAMMES TO POUNDS

1 kilogramme = 2.20462 pounds

	0	1	2	3	4	5	6	7	8	9	
..	..	22.046	44.092	66.139	88.185	110.231	132.277	154.323	176.37	198.42	..
1	22.046	44.092	66.139	88.185	110.231	132.277	154.323	176.37	198.42	41.888	1
2	44.092	88.185	110.231	132.277	154.323	176.37	198.42	210.478	232.525	254.571	2
3	66.139	88.185	110.231	132.277	154.323	176.37	198.42	210.478	232.525	254.571	3
4	88.185	110.231	132.277	154.323	176.37	198.42	210.478	212.524	234.571	256.617	4
5	110.231	132.277	154.323	176.37	198.42	210.478	212.524	214.571	236.617	258.663	5
6	132.277	154.323	176.37	198.42	210.478	212.524	214.571	216.617	238.663	260.719	6
7	154.323	176.37	198.42	210.478	212.524	214.571	216.617	218.663	240.719	262.776	7
8	176.37	198.42	210.478	212.524	214.571	216.617	218.663	220.719	242.776	264.833	8
9	198.42	210.478	212.524	214.571	216.617	218.663	220.719	222.776	244.833	266.933	9
10	210.478	212.524	214.571	216.617	218.663	220.719	222.776	224.833	246.933	268.988	10

TABLE 15. LITRES TO GALLONS

1 litre = 0.219976 gallons

	0	1	2	3	4	5	6	7	8	9	
..	..	0.220	0.440	0.660	0.880	1.100	1.320	1.540	1.760	1.980	..
1	2.200	4.400	6.600	8.800	11.000	13.200	15.400	17.600	19.800	21.800	1
2	4.400	8.800	11.000	13.200	15.400	17.600	19.800	21.800	23.800	25.800	2
3	6.599	13.198	18.897	24.596	30.295	35.994	41.693	47.392	53.091	58.790	3
4	8.799	17.598	26.397	35.196	43.995	52.794	61.593	70.392	79.191	87.990	4
5	10.999	21.998	34.997	47.996	60.995	73.994	86.993	99.992	112.991	125.990	5
6	13.199	25.398	38.397	51.396	64.395	77.394	90.393	103.392	116.391	129.390	6
7	15.398	28.798	41.797	54.796	67.795	80.794	93.793	106.792	119.791	132.790	7
8	17.598	32.198	45.197	58.196	71.195	84.194	97.193	110.192	123.191	136.190	8
9	19.798	35.598	48.597	61.596	74.595	87.594	100.593	113.592	126.591	139.590	9
10	21.998	39.998	52.997	65.996	78.995	91.994	104.993	117.992	130.991	143.990	10

TABLE 16. METRIC TONS TO TONS

1 metric ton = 0.984207 ton

TABLE 17. QUINTALS PER HECTARE TO TONS PER ACRE

1 quintal per hectare = 0.0398294 ton per acre

TABLE 18. NUMBERS PER SQUARE KILOMETRE TO NUMBERS PER SQUARE MILE
 (or Square Miles to Square Kilometres)

CONVERSION TABLES

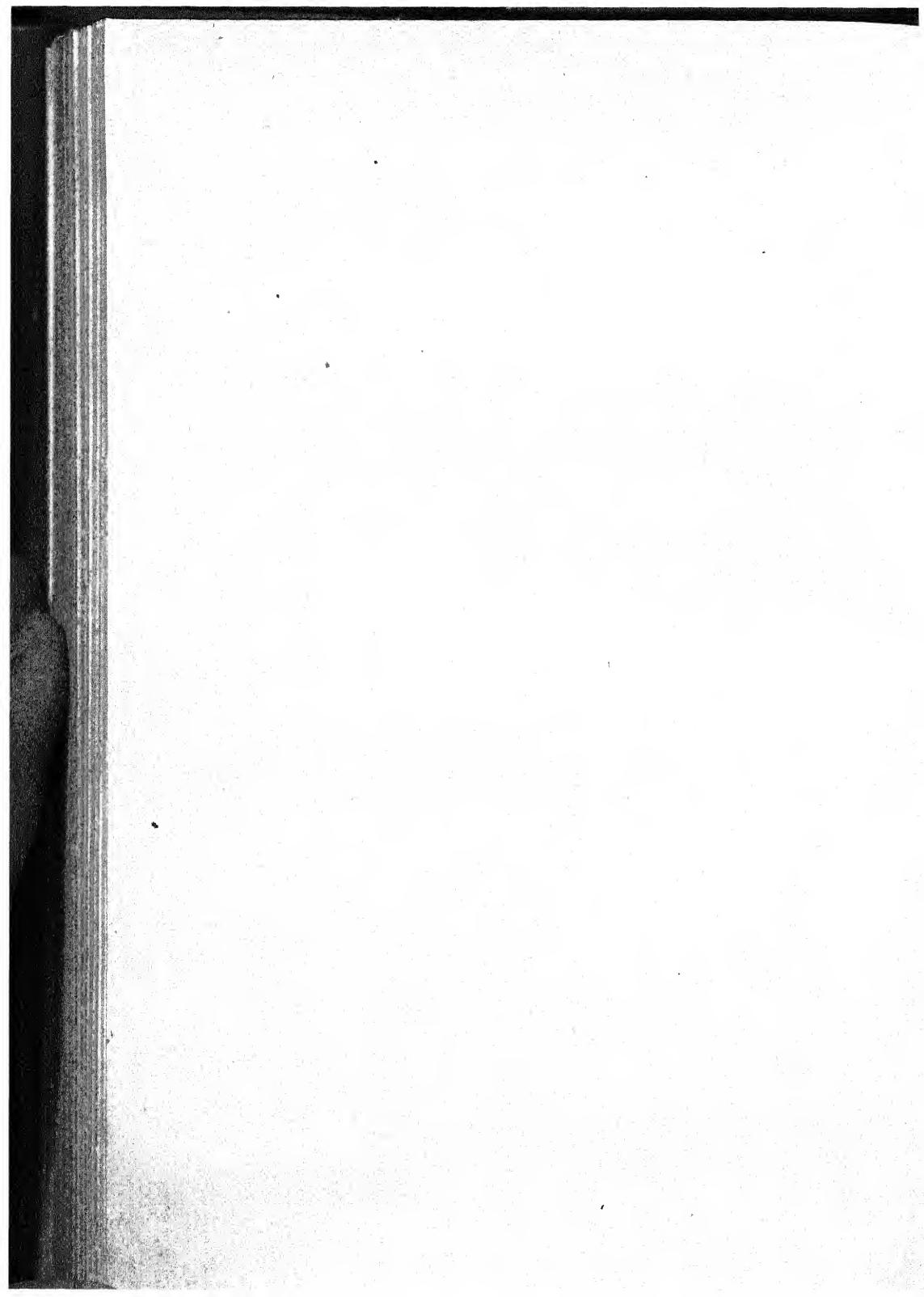
TABLE 19. DEGREES CENTIGRADE TO DEGREES FAHRENHEIT

	<i>Centigrade minus</i>									
	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9
-2	-4°0	-5°8	-7°6	-9°4	-11°2	-13°0	-14°8	-16°6	-18°4	-20°2
-1	14°0	12°2	10°4	8°6	6°8	5°0	3°2	1°4	-0°4	-2°2
..	32°0	30°2	28°4	26°6	24°8	23°0	21°2	19°4	17°6	15°8
	<i>Centigrade plus</i>									
..	32°0	33°8	35°6	37°4	39°2	41°0	42°8	44°6	46°4	48°2
+ 1	50°0	51°8	53°6	55°4	57°2	59°0	60°8	62°6	64°4	66°2
+ 2	68°0	69°8	71°6	73°4	75°2	77°0	78°8	80°6	82°4	84°2
+ 3	86°0	87°8	89°6	91°4	93°2	95°0	96°8	98°6	100°4	102°2
+ 4	104°0	105°8	107°6	109°4	111°2	113°0	114°8	116°6	118°4	120°2
+ 5	122°0	123°8	125°6	127°4	129°2	131°0	132°8	134°6	136°4	138°2
+ 6	140°0	141°8	143°6	145°4	147°2	149°0	150°8	152°6	154°4	156°2
+ 7	158°0	159°8	161°6	163°4	165°2	167°0	168°8	170°6	172°4	174°2
+ 8	176°0	177°8	179°6	181°4	183°2	185°0	186°8	188°6	190°4	192°2
+ 9	194°0	195°8	197°6	199°4	201°2	203°0	204°8	206°6	208°4	210°2
+ 10	212°0									+10
	0	1	2	3	4	5	6	7	8	9

TABLE 20. PRESSURE: EQUIVALENTS OF MILLIBARS, MILLIMETRES OF MERCURY, AND INCHES OF MERCURY AT 32° F. IN LATITUDE 45°

<i>Mercury in.</i>	<i>Milli- bars</i>	Mercury mm.	Mercury in.	Milli- bars	Mercury mm.	Mercury in.	Milli- bars	Mercury mm.	Mercury in.	Milli- bars	Mercury mm.	Mercury in.	Milli- bars	<i>Mercury mm.</i>	<i>Mercury in.</i>
27.02	915	686.3	27.82	942	706.6	28.62	969	726.8	29.41	996	747.1	30.21	1,023	767.3	
27.05	916	687.1	27.85	943	707.0	28.65	970	727.6	29.44	997	747.8	30.24	1,024	768.1	
27.08	917	687.8	27.88	944	708.1	28.67	971	728.3	29.47	998	748.6	30.27	1,025	768.8	
27.11	918	688.6	27.91	945	709.4	28.70	972	729.1	29.50	999	749.3	30.30	1,026	769.6	
27.14	919	689.3	27.94	946	710.6	28.73	973	729.8	29.53	1,000	750.1	30.33	1,027	770.3	
27.17	920	690.1	27.97	947	710.3	28.76	974	730.6	29.56	1,001	750.8	30.36	1,028	771.1	
27.20	921	690.8	28.00	948	711.1	28.79	975	731.3	29.59	1,002	751.6	30.39	1,029	771.8	
27.23	922	691.6	28.03	949	711.8	28.82	976	732.1	29.62	1,003	752.3	30.42	1,030	772.6	
27.26	923	692.3	28.05	950	712.6	28.85	977	732.8	29.65	1,004	753.1	30.45	1,031	773.3	
27.29	924	693.1	28.08	951	713.3	28.88	978	733.6	29.68	1,005	753.8	30.48	1,032	774.1	
27.32	925	693.8	28.11	952	714.1	28.91	979	734.3	29.71	1,006	754.6	30.51	1,033	774.8	
27.35	926	694.6	28.14	953	714.8	28.94	980	735.1	29.74	1,007	755.3	30.53	1,034	775.6	
27.38	927	695.3	28.17	954	715.6	28.97	981	735.8	29.77	1,008	756.1	30.56	1,035	776.3	
27.41	928	696.1	28.20	955	716.3	29.00	982	736.6	29.80	1,009	756.8	30.59	1,036	777.1	
27.44	929	696.8	28.23	956	717.1	29.03	983	737.3	29.83	1,010	757.6	30.62	1,037	777.8	
27.46	930	697.6	28.26	957	717.8	29.06	984	738.1	29.86	1,011	758.3	30.65	1,038	778.6	
27.49	931	698.3	28.29	958	718.6	29.09	985	738.8	29.89	1,012	759.1	30.68	1,039	779.3	
27.52	932	699.1	28.32	959	719.3	29.12	986	739.6	29.92	1,013	759.8	30.71	1,040	780.1	
27.55	933	699.8	28.35	960	720.1	29.15	987	740.3	29.94	1,014	760.6	30.74	1,041	780.8	
27.58	934	700.6	28.38	961	720.8	29.18	988	741.1	29.97	1,015	761.3	30.77	1,042	781.6	
27.61	935	701.3	28.41	962	721.6	29.21	989	741.8	30.00	1,016	762.1	30.80	1,043	782.3	
27.64	936	702.1	28.44	963	722.3	29.24	990	742.6	30.03	1,017	762.8	30.83	1,044	783.1	
27.67	937	702.8	28.47	964	723.1	29.26	991	743.3	30.06	1,018	763.6	30.86	1,045	783.8	
27.70	938	703.6	28.50	965	723.8	29.29	992	744.1	30.09	1,019	764.3	30.89	1,046	784.6	
27.73	939	704.3	28.53	966	724.6	29.32	993	744.8	30.12	1,020	765.1	30.92	1,047	785.3	
27.76	940	705.1	28.56	967	725.3	29.35	994	745.6	30.15	1,021	765.8	30.95	1,048	786.1	
27.79	941	705.8	28.59	968	726.1	29.38	995	746.3	30.18	1,022	766.6	30.98	1,049	786.8	

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